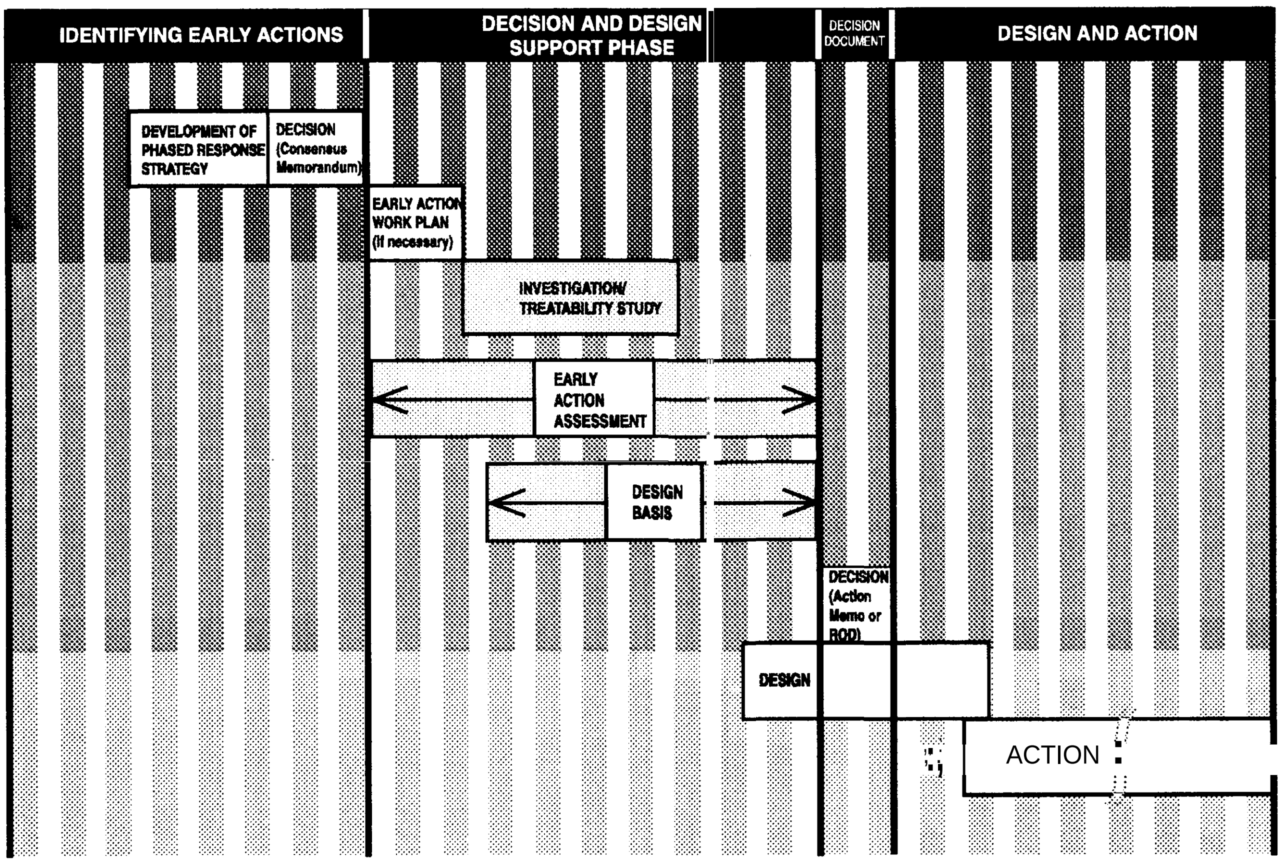
DOE/EH-0506

Environmental Guidance

Phased Response/ Early Actions



U.S. Department of Energy
Washington, D.C.

Office of Envlronmental Activities
(EM-22)

Office of Environmental Policy & Assistance
RCRA/CERCLA Division
(EH-413)

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United States Government **Department of Energy**

memorandum

DATE: November 22, 1995

REPLY TO~
ATTN OF: **Office of** Environmental Policy and Assistance(EH-413): Dailey :6-7117

SUBJECT: **PHASED RESPONSE/EARLY ACTIONS UNDER CERCLA**

TO: Distribution

PURPOSE OF THIS MEMO

This memorandum transmits the environmental guidance document *Phased Response/Early Actions under CERCLA,* prepared by the Office of Environmental Policy and Assistance, RCRA/CERCLA Division (EH-413) with support from the Office of Environmental Activities (EM-22).

BACKGROUND

The National Contingency Plan (NCP), the Environmental Protection Agency (EPA) Superfund Accelerated Cleanup Model (SACM), and the joint EPA/DOE/DOD "Guidance on Accelerating CERCLA Environmental Restoration at Federal Facilities" encourage the use of *early actions* (time critical and non-time critical removal actions/ intirim remedial actions) to achieve timely risk reduction at contaminated sites.

The EPA "Guidance for Evaluating the Technical Impracticability of Groundwater Restoration" promotes the use of both early actions and longer-term actions in a "phased approach."

The above regulations and guidances align with the Office of Environmental Management's strategic objective to aggressively use early actions to achieve quick, cost-effective risk reduction.

OBJECTIVE OF GUIDANCE

This environmental guidance document explains how to:

- detemine which site problems are candidates for early actions

determine which early action authority (removal or remedial) would be best for a particular contaminated site scenario

- develop and document a phased response strategy to implement early actions under the two remedial authorities

- development of aggressive phased response/early action strategies are fully compliant with CERCLA legislation, regulation and guidance

Also, examples (including sample documentation) on how DOE sites have used a phased response/early action strategy are provided.

RELATED GUIDANCE	The attached environmental guidance document is the second in a three-part series being developed by EH-413 in collaboration with EM. The first document in this series "Remedial Investigation/ Feasibility Study (RI/FS) Process, Elements and Techniques" was published in December 1993 (DOE/EH-94007658), and the third document to be issued in late 1996, will address environmental restoration implementation issues associated with Remedial Design/Remedial Action (RD/RA) under CERCLA. This series of environmental guidance documents serve as a *continuing reference work* that can be consulted for information and instruction on the conduct of CERCLA compliant, accelerated cleanup activities under the Streamlined Approach for Envimnmental Restoration (SAFER).
INTENDED AUDIENCE	DOE personnel with management/oversight responsibility for environmental restoration activities conducted under CERCLA. Contractor personnel responsible for developing and implementing those activities. Federal and State regulatory personnel with oversight responsibility for DOE sites. Stakeholders and others with an interest in the DOE environmental Restoration program.
FURTHER INFORMATION	For further information contact Rich Dailey, EH-413, by... ■ calling (202) 586-7117, ■ faxing messages ▼❑ (202) 586-3915 communicating electronically, via Internet, to richard.dailey@ hq.doe.gov.

Thomas T. Traceski

Director, RCRA/CERCLA Division
Office of Environmental Policy and Assistance

Attachment

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Remedial Action Program Information Center
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PHASED RESPONSE/

under the
Comprehensive Environmental Response,
Compensation, and Liability Act
(CERCLA)

NOVEMBER 1995

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U.S. Department of **Energy**

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Office of Environmental Activities
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This document was developed by the Department of Energy's Office of Environmental Policy and Assistance (EH-41) within the Office of Environment, Safety and Health, and the Office of Environmental Activities (EM-22) within the Office of Environmental Management. TechnicaJ support was provided by Project Performance Corporation, EG&G Environmental, Incorporated, and CH2M HILL, Incorporated. The project team included DOE Project Manager Rich Dailey (EH-41), Technical Project Manager Jeff Smyth (Project Performance Corporation, Richland, Washington), Craig Cheney (Project Performance Corporation, Sterling, Virginia), Steve Wilhelm (EG&G Environmental, Corvallis, Oregon) and Technical Writer Gail Payne (CH2M HILL, Oak Ridge, Tennessee). Larry Helm (CDM Federal programs, Oak Ridge) and Gaynor Dawson (EG&G Environmental, Richland, Washington) acted as Senior Technical Reviewers.

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Acronyms

ADS	activity data sheet
AEC	Atomic Energy Commission
ARARs	applicable or relevant and appropriate requirements
BDAT	best demonstrated available technology
BGS	below ground surface
CAMU	Corrective Action Management Unit
CDD	Conceptual Design Document
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CM	consensus memorandum
CRP	Community Relations Plan
CWA	Clean Water Act
cy	cubic yard
D&D	decontamination and decommissioning
DOE	Department of Energy
DQO	data quality objective
EA	Environmental Assessment
EDC	engineered drainage channel
EE/CA	Engineering Evaluation/Cost Analysis
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ER	Environmental Restoration (DOE Program)
ESA	Endangered Species Act
FFA	Federal Facilities Agreement

FFS	Focused Feasibility Study
FID	flame ionization detector
FONSI	Finding of No Significant Impact
FSP	Field Sampling Plan
gpd	gallons per day
gpm	gallons per minute
GW	groundwater
HP	health physics
HSP	Health and Safety Plan
ID	Idaho Field Operations
IDW	investigation-derived waste
INEL	Idaho National Engineering Laboratory
IRM	interim remedial measure
LDR	land disposal restriction
LFI	limited field investigation
LLW	low-level waste
LSA	low specific activity
MCL	Maximum Contaminant Level
M&O	management and operating (contractor)
mph	miles per hour
MSA	Major Systems Acquisition
msl	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NFA	no further action
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System

NPL	National Priorities List
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
NWS	National Weather Service
O&M	Operations and Maintenance
O.A.C.	Ohio Administrative Code
Osc	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
Ou	operable unit
PA	Preliminary Assessment
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PEW	process equipment waste
PID	photoionization detector
POLREPS	pollution reports
ppb	parts per billion
PPE	Personal Protective Equipment
ppm	parts per million
PRG	Preliminary Remediation Goal
PRS	potential release site
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
RA	Remedial Action
RAGS	Risk Assessment Guidance for Superfund
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act

RDIRA	Remedial Design/Remedial Action
RESRAD	Residual Radioactive Material Program
RI/FS	Remedial Investigation/Feasibility Study
ROD	record of decision
RSE	Removal Site Evaluation
RWMC	Radioactive Waste Management Complex
RWP	radiation work permit
SACM	Superfund Accelerated Cleanup Model
SAFER	Streamlined Approach For Environmental Restoration
SAP	Sampling and Analysis Plan
SRE	streamlined risk evaluation
TNT	trinitrotoulene
TOX	total organic halogen
TRU	transuranic
TSA	temporary storage area
TSCA	Toxic Substances Control Act
TSD	treatment, storage, and disposal
TSF	temporary storage facility
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
WAG	Waste Area Grouping
WSSRAP	Weldon Spring Site Remedial Action Project

Document Use

Audience

This guidance document is primarily intended for Department of Energy (DOE) personnel with line-management responsibility for environmental restoration efforts conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at DOE facilities. It describes in detail the components of a phased response, explains how each component should be conducted and what should be accomplished, and defines what documents need to be produced to expedite actual cleanup of site problems. The document also is applicable for use by DOE contractors responsible for the technical development of actions that make up a phased response, and by those technical staff, whether DOE employees or contractors, who review early action documents for technical and regulatory adequacy.

The document incorporates the principles of the Streamlined Approach For Environmental Restoration (SAFER). SAFER is an approach for remediating specific site problems through focused definition of site problems, reasonable deviations to those problems, decision rules, and contingency plans. One of the fundamental precepts of the SAFER process is that stakeholders [defined as DOE, DOE's Federal and State regulators, other interest groups (e.g., Native Americans), and the public] must be intimately involved in the conceptualization and development of strategies and in the many decision points along the way toward their completion. In this regard, this document should also be of interest to the stakeholders participating in early action compliance at DOE facilities. Because this guidance lays out the general steps and methods that should be used in any DOE phased response, it can serve as a map to the process and as a guide to where the stakeholders can expect opportunities to participate in the evaluations and decisions that are critical to the process.

As with other DOE guidance documents, this document refers to three levels of persons who are involved in planning and conducting environmental restoration projects: (1) the internal project team, composed of DOE and its contractors (2) the extended project team, which includes the internal project team, the U.S. Environmental Protection Agency (EPA) and State regulatory staff, public interest group that have decisionmaking authority, and others with direct technical expertise or a significant stake in the project result; and (3) other stakeholders.

Format

The elements of a phased response are different types of removal and remedial actions. This document focuses specifically on those that are early actions [i.e., any non-final action (for example, removals and early/interim remedial)]. This document and the strategy provided herein group early actions according to the timing in which they might be performed and the urgency with which they are performed. Thus, the four modules of this guidance address (1) phased response strategy, (2) contingent removal action approaches, (3) time-critical removal actions, and (4) non-time-critical removal actions and early remedial actions.

All these types of actions provide opportunities for streamlining the planning/investigation phase and the actual remediation phase. This guidance focuses on the planning/investigation/remedy selection activities. Implementation of environmental restoration efforts will be the subject of a future companion document, DOE's Environmental Restoration Design and Implementation Guidance.

The format for presenting the discussions and information in this guidance was developed specifically for preparing DOE guidance documents. It is a way to present information on complex regulatory requirements in an accessible manner. Using flowcharts, step-by-step instructions, and detailed examples, the format distills statutory and regulatory requirements and guidance into essential concepts and logical steps necessary to meet the requirements.

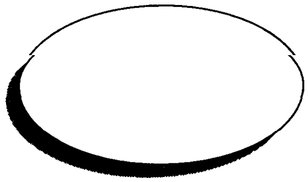
This format reserves the left-hand page for graphics (e.g., flowcharts, icons). The graphic pages are used primarily to provide a quick reference to find information of interest. When a graphic is not appropriate for the left-hand page, the reader is informed that the page was "intentionally left blank. " Right-hand pages are reserved for text.

Information is arranged in modules, each representing a major aspect of the project. Completing the steps in a module culminates in producing a major report or other product required in the process. Modules may be divided into submodules. Each submodule begins by graphically illustrating its main contents on a left-hand page. The supporting text page on the right provides background information, organization of the module, and relevant references. Each submodule includes flowchart graphics on a left-hand page that illustrate the main elements of the submodule as steps in process flowcharts. Detailed information on each step is provided on the facing right-hand pages. The distilled information provided in the flowcharts and in the steps is followed by technical notes on certain aspects of the process. Notes provide more detailed supporting guidance than is provided in the process steps. Notes include examples, outlines, checklists, and expanded technical discussions with marginal notes. The graphical format used in this document is shown in the figures on pp. xi and xii.

Cross references are provided between modules where necessary to show the connections between steps. The references may be at any level (e.g, module to module, submodule to submodule, step to module, note to module).

Document Graphics

Graphics are central elements of this guidance document. The graphics are used to help guide users through the Phased Response process, provide key information, and illustrate supporting materials. Graphics concepts include flowchafls, icons, examples, and information boxes. Symbols used in this document observe the following conventions:



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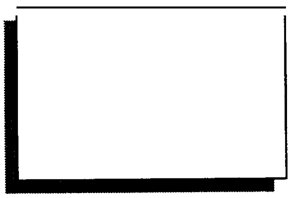

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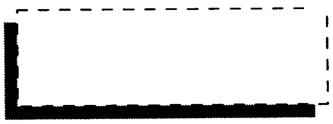
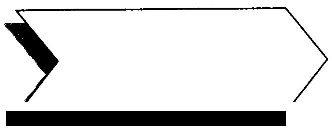


Thin Dashed Line Rectangles contain notes "continued on" or "continued from." Read the notes for guidance through flowcharts.



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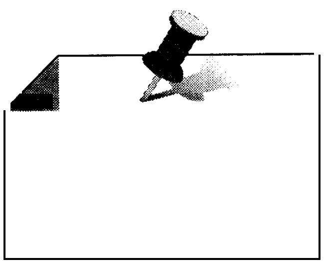
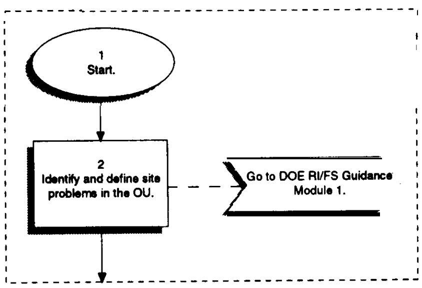


Note Pad Icons contain information that may be key text, a cross reference in the guidance, a key reference document, or other concepts that require special note. No action is associated with Note Pad Icons.



Compressed Icons provide a summary of steps on previous pages.

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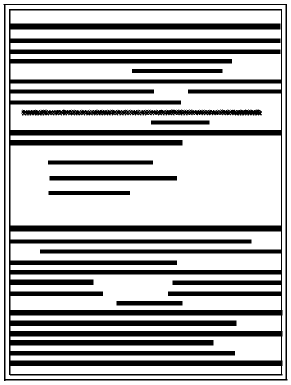

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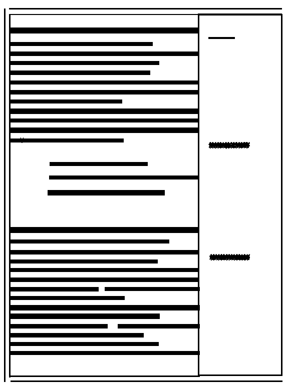

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- These notes may be edited, unedited, or excerpted.
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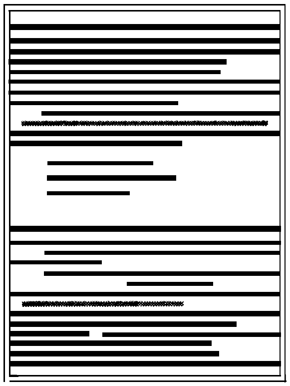

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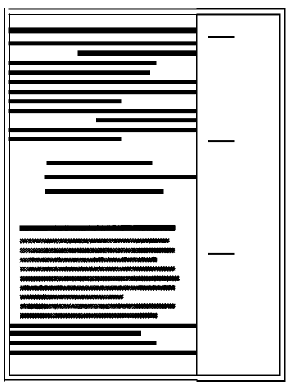

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Introduction

Introduction

1. Phased Response Strategy
2. Contingent Removal Action Approaches
3. Time-Critical Removal Actions
4. Non-Time-Critical Removal Actions and Early Remedial Actions

Introduction

- Background
- Phased Response
- Assumptions
- Relationship to Other Streamlining Initiatives
- Specific CERCLA Authorities Allowing a Phased Response
- Specific Advantages for Using a Phased Response
- Applying a Phased Response Strategy

Introduction

The Department of Energy's (DOE's) Office of Environmental Policy and Assistance (EH-41) within the Environment, Safety and Health organization and Office of Environmental Activities (EM-22) within the Environmental Management organization have issued this document to provide implementation guidance on developing strategies for early actions, planning for early actions, and conducting early actions. This guidance is primarily intended for DOE personnel with line-management responsibility for environmental restoration efforts conducted pursuant to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) activities at DOE facilities. It describes in detail how to plan and implement early actions in a phased manner.

This is a companion document to DOE's *Remedial Investigation/Feasibility Study (RI/FS) Process, Elements and Techniques Guidance* (henceforth, DOE's RI/FS guidance). It builds on the explanations and direction provided in DOE's RI/FS guidance and frequently refers the reader to that document for further detail. Together, these two documents provide guidance for conducting CERCLA activities prior to a final Record of Decision (ROD) and provide a foundation for designing and implementing actions.

EH-41 has also issued *CERCLA Removal Actions (DOE/EH-0435;* DOE, 1994), which provides detailed guidance on the regulatory process for emergency, time-critical, and non-time-critical removal actions. It should be used to supplement this guidance.

Background

DOE facilities such as Hanford, Savannah River, and Idaho National Engineering Laboratory are large and complex; even DOE's smaller facilities are complex relative to non-federal facility National Priorities List (NPL) sites. Most of DOE's facilities are scheduled to take many years to remediate. DOE's goal is to accelerate the cleanup process wherever possible. The most direct way of accelerating remediation is to identify those site problems that are more critical or immediately solvable and take those actions first.

Most DOE facilities have been divided into groups of potential site problems, variously called operable units, waste area groupings, and other terms. For facilities on the NPL, each of these operable units is in some stage of the CERCLA process, on its way to being completely remediated. The goal for each operable unit is to reach a final decision point that is protective of human health and the environment. This final decision for an operable unit will sometimes be to take no further action; other times specific further action is necessary.

But, it is not necessary to put off all remediation until every detail of an operable unit is understood and the stakeholders are prepared to decide everything in a single ROD. Almost any operable unit is likely to include site problems that are more critical or are simpler than the rest, some things that can and should be addressed before the final decision is made for the entire operable unit. Identifying and pursuing such opportunities for early actions is the focus of this document.

Phased Response

Because operable units tend to include a variety of site problems, a response that uses various types of approaches will often prove best. CERCLA offers several types of response actions, under different authorities, to suit differing needs, from emergency removals to final remedial actions. These actions go by a variety of informal names at various DOE facilities and Environmental Protection Agency (EPA) Regions, as discussed further below. But, in this document, they are divided into just five types of actions:

- **Emergency removal actions.** Actions taken under CERCLA Section 104 Authority to respond to acute site problems.

- **Time-critical removal actions.** Actions taken under CERCLA Section 104 Authority to respond to site problems that require less than 6-months planning prior to field implementation.

- **Non-time-critical removal actions.** Actions taken under CERCLA Section 104 Authority to respond to site problems that require more than 6-months planning prior to field implementation.

- **Early remedial actions.** Actions taken under CERCLA Section 106 Authority to respond to site problems prior to a final ROD for an operable unit. Early remedial actions can be final resolutions to individual site problems or interim resolutions to individual site problems.

- **Final remedial actions.** Final actions taken under CERCLA Section 106 Authority documented in the ROD that addresses all site problems in an operable unit. Final remedial actions are used (in this document) to make ultimate cleanup decisions for all the individual site problems within an operable unit, including those addressed by early actions.

The first four types are termed early actions.

This guidance encourages use of a phased response to remediating operable units: using early actions to address the more obvious or more easily remediable problems, leaving the more complex or lower risk problems to final actions after the final ROD is signed. By developing a phased response strategy that incorporates early actions wherever feasible, any operable unit can be moved more quickly both to effective reduction of the most significant risks and to a final ROD and complete remediation.

A phased response uses a sequence of early and final actions to tackle the numerous problems presented by a typical operable unit. A phased response strategy identifies each of the separable problems in the operable unit and assigns to each one of these actions tentative dates for initiating and completing the action.

A phased response includes the overall investigation (RI/FS) of the operable unit that leads toward the final ROD for remedial actions. There is a helpful synergism between the early actions and the more comprehensive progress toward complete remediation of the operable unit. The RI/FS is used to identify site problems amenable to early action and can provide data and insight to early actions. And, as each early action is undertaken (perhaps preceded by a limited investigation), more is learned about the site, which adds to the knowledge gained through the RI and FS. Thus the results of the early actions can help in focusing or strengthening the RI/FS and the final ROD.

Assumptions

Certain assumptions are inherent in the concepts and strategies presented in this guidance:

- **Early actions are advantageous.** Achieving remediation sooner is an advantage all by itself and can be a legitimate objective of an early action.

- **Early actions should be based on consensus between DOE and its regulators.** Although DOE has authority in many instances to pursue removals without formal concurrence of its regulators, the consensus on the need for an early action is valuable in all instances and should be sought wherever possible. A consensus memorandum is used to document DOE and regulatory agency agreement to take action to resolve a site problem.

- **The need to conduct early actions can be based on a variety of factors.** DOE and regulatory agencies can reach consensus on the need to take action on the basis of multiple factors including historical knowledge, lack of complete exposure pathway, existing site standards [e.g., decontamination and decommissioning (D&D), cleanup levels] and precedence, and background levels (natural and man-made).

- **Formal risk assessment is not required to identify the need for early actions.** Health risk associated with a site problem is one but not the only factor that may be used for deciding to take early action. When the decision to take action is based on risk, the risk evaluation procedure does not need to be a formal baseline risk assessment. Submodule 1.1, Note B provides an example process for determining whether early action is necessary. Formal risk assessment (e.g., baseline risk assessment) is conducted as part of the RI/FS process for site problems that are not addressed through early action. For guidance on conducting risk assessments see DOE's RI/FS guidance (DOE, 1993).

The purposes of the rest of this introduction are to discuss how the concepts in this guidance (i.e., phased response and early actions) are consistent with other efforts to streamline environmental restoration, to introduce the legal authorities that make up a phased response, and to summarize the specific streamlining advantages that a phased response offers.

Relationship to Other Streamlining Initiatives

The use of early actions during environmental restoration is not a new concept. The National Oil and Hazardous Substances Pollution Contingency Plan's (NCP'S) bias for action and the discussions found in EPA's RI/FS guidance as well as in DOE's RI/FS guidance encourage the use of early actions. However, early actions have not been commonly used in the DOE complex, in part because of a lack of clear understanding of their usefulness and advantages; methods for combining these actions into a phased response have not been articulated for all potentially contaminated media. NCP support for the use of a phased response is found in Note A to this Introduction.

For groundwater, a cornerstone of the EPA's streamlining philosophy is an approach described in *Guidance for Evaluating Technical Impracticability of Ground Water Remediation* (OSWER Directive 9234.2-24) and *Considerations in Ground-Water Remediation at Superfund Sites and RCRA Facilities* (OSWER Directive 9283.1-06). These documents encourage "early actions to control plume migration and remove contaminant sources, reducing risks and providing information usefil in identifying the restoration potential of the site." EPA also notes that "phasing of activities does not lengthen or deter the remediation process; rather if approached properly, phasing of activities should expedite the process by reducing risk and by bringing final cleanup levels closer to completion of the RI/FS." DOE recognizes that these concepts are valuable for all media and seeks to develop a similar logical framework for phasing actions.

In addition to existing guidance on best use of early actions, EPA and DOE have taken several initiatives to streamline actions and encourage their more frequent use. This guidance is consistent with and supports the initiatives discussed below.

Superfund Accelerated Cleanup Model. EPA has initiated a CERCLA streamlining initiative, the Superfund Accelerated Cleanup Model (SACM) program, which uses removal authorities at remedial sites to achieve earlier risk reduction and to increase the efficiency of actions. Principles of the SACM program are as follows:

- Provide an ongoing process for evaluating site-specific conditions and need for action.
- Allow for cross-program coordination of response planning.
- Facilitate prompt risk reduction through early action.
- Ensure appropriate cleanup of long-term environmental problems.
- Ensure early public notification and participation.
- Define conditions where removal actions are appropriate.

SACM principles are met through the phased response presented in this guidance. For example, DOE's phased response emphasizes prompt risk reduction through early action, public notification and participation, and defining conditions where removal actions are appropriate. Module 1, Phased Response Strategy, elaborates on these points.

RCRA Stabilization Initiative. For Resource Conservation and Recovery Act (RCRA) actions, EPA has developed a stabilization initiative that is similar to SACM but relies on different statutory and regulatory preferences for action. Stabilization initiatives generally rely on well-understood technologies to limit the migration of contaminants, to reduce immediate threats, and to contribute to understanding the range of existing problems. DOE is preparing a separate guidance on accelerating RCRA corrective actions at DOE facilities; they are not discussed further in this guidance.

Presumptive and Generic Remedies. EPA has developed presumptive remedies for certain types of site problems commonly occurring at the Superfind Sites. These remedies are supported by a National Administrative Record that facility managers can use to streamline work plan development, definition and selection of alternatives, and remedy selection. Generic remedies are similar to presumptive remedies, but are less formal and not supported by National Administrative Records. Examples of generic remedies are technology matrices, which summarize the potential applicability of technologies but not in enough detail to be considered an administrative record. Presumptive and generic remedies should be used when appropriate in a phased response.

SAFER. DOE has developed the Streamlined Approach For Environmental Restoration (SAFER) as its own streamlining initiative. SAFER specifically addresses management of uncertainties during remediations at DOE facilities. SAFER combines (1) the data quality objective (DQO) process objective of reducing uncertainty in measuring and interpreting data with (2) the observational approach objective of managing uncertainty in implementing alternatives. SAFER's tenets are integrated in DOE's RI/FS guidance and in this guidance.

Specific CERCLA Authorities Allowing a Phased Response

Authorization for early actions comes from two sections of CERCLA: removal authority from Section 104 and remedial authority from Section 106. The distinction between these two authorities is not greatly significant in the DOE Environmental Restoration (ER) program because DOE is the lead agency and the same EPA and State regulatory staff are generally involved in the oversight function. However, a necessary step under CERCLA is to declare which authority is being used. Many site problems can be addressed by either authority, although some Federal Facilities Agreements (FFAs) may restrict this flexibility. Procedural and documentation differences exist depending on which authority is used. Where flexibility among authorities exists, facility managers need to consider the advantages of each authority in making decisions.

Specific Advantages for Using a Phased Response

The inherent advantages of early actions constitute powerful arguments for the extended project team and other stakeholders in supporting the use of a phased response. These expected advantages can also be used as benchmarks for measuring the success of a phased response. The advantages include the following:

> **Expedite actions.** A phased response can result in actions that overall are quicker and more efficient (thereby expediting the process) in several ways. This more efficient use of resources (e.g., less data collection, less alternatives development, and better tailoring of the action to the site problems) also allows the final RI/FS to be focused on the more complex problems that remain after the early actions are completed.
>
> A phased response also emphasizes opportunities for parallel or concurrent conduct of several activities that are historically carried out sequentially (e.g., investigation, decision, design). A particular emphasis of the phased response is to complete preliminary remedial design documents prior to completing decision documentation. By using data and documents to serve multiple purposes, a phased response can reduce the overall time needed to move through an investigation and to begin actual remediation.
>
> **Reduce risks.** Early actions can limit exposure and halt migration of contamination quicker than comprehensive RI/FS/Remedial Design/Remedial Action (RD/RA) approaches. This directly supports the main intent of CERCLA and the NCP. Early protectiveness is usually the strongest justification for developing or implementing a phased response strategy. A phased response should always identify opportunities for early risk reduction, and can begin actual progress toward meeting cleanup goals even if comprehensive designs for facility land use have not been made.
>
> An additional advantage of a phased response exists where final solutions (e.g., treatment technologies, waste disposal) for a site problem are not yet available but where wastes pose a current (or near-term future) risk to the environment, workers, or other receptors. DOE faces many such situations (e.g., radioactive wastes). Where such situations exist (e.g., radionuclide-contaminated soils), a final ROD would likely require delay of a solution until the technology was developed or constructed or until a final waste management decision was made. The phased response facilitates interim risk reduction through such activities as removal and storage. Although a phased response may result in implementability issues, such as the need for interim storage capacity, and may result in additional Operations and Maintenance (O&M) costs to maintain compliance, careful definition of the problems to be addressed with an early action (e.g., a priori agreements about the definitions of contaminant concentrations that constitute hot spots or unacceptable risks and the amount of wastes that will be excavated) can offset these problems and improve the overall effectiveness of the entire environmental restoration program for the operable unit.
>
> **Demonstrate progress.** Phased responses show earlier progress (e.g., implementing actions) to the stakeholders than the comprehensive CERCLA approach because they result in early cleanup of actual problems. Demonstrating early progress may be enough reason to implement a phased response, providing the action is cost effective.
>
> Another advantage of a phased response is building momentum that leads to an improved overall process for conducting environmental restoration. Even small accomplishments achieved under a phased response can build momentum for additional progress, in many instances leading to a new or even more logical approach to addressing whole operable unit or facility-wide environmental remediation challenges.

A phased response can also show progress by providing an avenue for testing new techniques, management approaches, or even technologies. CERCLA already encourages the use of treatability studies for trying new technologies. In some instances, a treatability study can be incorporated as part of a phased response. If a technology proves useful and effective, the phased response also provides a forum for continuing the technology (as an early action) before a final remediation decision is made.

Respond to stakeholder and other Priorities. Integrating stakeholder concerns and incorporating new information learned during a phased response may lead to changes in the priorities for addressing site problems. A phased response process provides a forum for responding to stakeholder concerns. For example, on the basis of stakeholder concerns, several DOE facilities have made significant changes in the priority given under original plans to remediate certain site problems most amenable to early transfer for public or other non-DOE uses, A phased response provides the flexibility to address these changing priorities quickly and efficiently.

Reduce costs. A phased response leads to cost reduction similar to the ways in which it contributes to expediting an action. There are three cost-reducing impacts. First, a phased response leads to better focused studies of reduced scope (i.e., not final) that generally require fewer data to support decisions. Second, by selecting the most appropriate authority, actions are commensurate with the complexity of the problem. That is, a comprehensive RI/FS is not needed to select a remedy for a problem with a relatively obvious solution. Third, by allowing for the concurrent preparation of remedial design documents, the overall amount of time can be reduced for preparing documents and conducting actions. This results in lower overall program costs.

Applying a Phased Response Strategy

Environmental restoration programs are implemented at three levels: (1) facility-wide through program or management plans or agreements, often in the form of an FFA or other strategic planning process; (2) operable units, which focuses on the specific investigation and remediation plans that will lead to design documents and subsequent actions; and (3) problem planning, the level at which specific data needs are identified, remediation goals are specified, and technologies are applied, Site problems are generally associated with discrete waste units or parts of discrete waste units, while operable units are an aggregation of site problems.

A phased response strategy can be established for an entire facility, an operable unit, or a subset of site problems. The strategy can also be developed as response activities are first initiated or at any point in the process after source planning or fieldwork has occurred. For example, at a facility with established operable units, a DOE project manager or designee and the extended project team can identify what site problems within an operable unit may warrant early action and how the various early actions will be used to achieve the most efficient movement toward final cleanup. Therefore, the strategy for an operable unit could identify problems amenable to early action, the specific removal and remedial authorities that will be used to support investigation and action for each problem, the planned timing of the response, and issues associated with integrating the phased response and the final cleanup. In other instances, a phased response may be appropriate before a subset of site problems is formed into an operable unit, after initiating some investigation on an operable unit, or (if the problems are few enough or well enough understood) on an entire facility. Likewise, after initial development, DOE may want to revisit the strategy throughout implementation to ensure that the most efficient remediation path is maintained. The central point is that a phased response can be adapted to meet any site-specific conditions at any point in the remediation process. See Submodule 1.1, Development of a Phased Response Strategy, for additional detail.

Regardless of DOE's level of development of a phased response strategy, additional planning will be needed prior to implementing a specific early action. The exact site problem, objective, scope, and measures of success must be defined specifically for each anticipated early action. These decisions are incorporated into a consensus memorandum or as an appendix in an existing document. A specific purpose of the consensus memorandum is to document that DOE and its regulators have agreed that a site problem requires early action. The consensus memorandum also forms the basis for an action memorandum or work plan, if necessary: for simple site problems, the consensus memorandum may even encompass the action memorandum or work plan. Like the strategy, the consensus memorandum is a short document, generally less than 10 pages. See Submodule 1.2, Development of a Consensus Memorandum, for additional detail.

Note that the importance of pursuing a phased response in cooperation with the regulatory agencies cannot be overemphasized. Progress on a phased response cannot be ensured unless the regulatory agencies are part of the process from the earliest scoping steps and kept informed of or involved in every major decision. A phased response has to be a joint effort by DOE and the regulatory agencies because moving a facility, operable unit, or subset of site problems more quickly to effective risk reduction requires more aggressive use of available data, making decisions earlier in the process, and proceeding on the basis of less complete analyses and less formal documentation because solutions are more obvious. Although DOE has authority to act on its own for some removal actions, in reality DOE needs to coordinate even these removal actions very closely with EPA and the states, because all parties have an interest in ensuring that removal actions are consistent with and will not preclude the envisioned final actions. The need to involve the regulatory agencies in early remedial actions is even more direct, because EPA will have to sign the ROD.

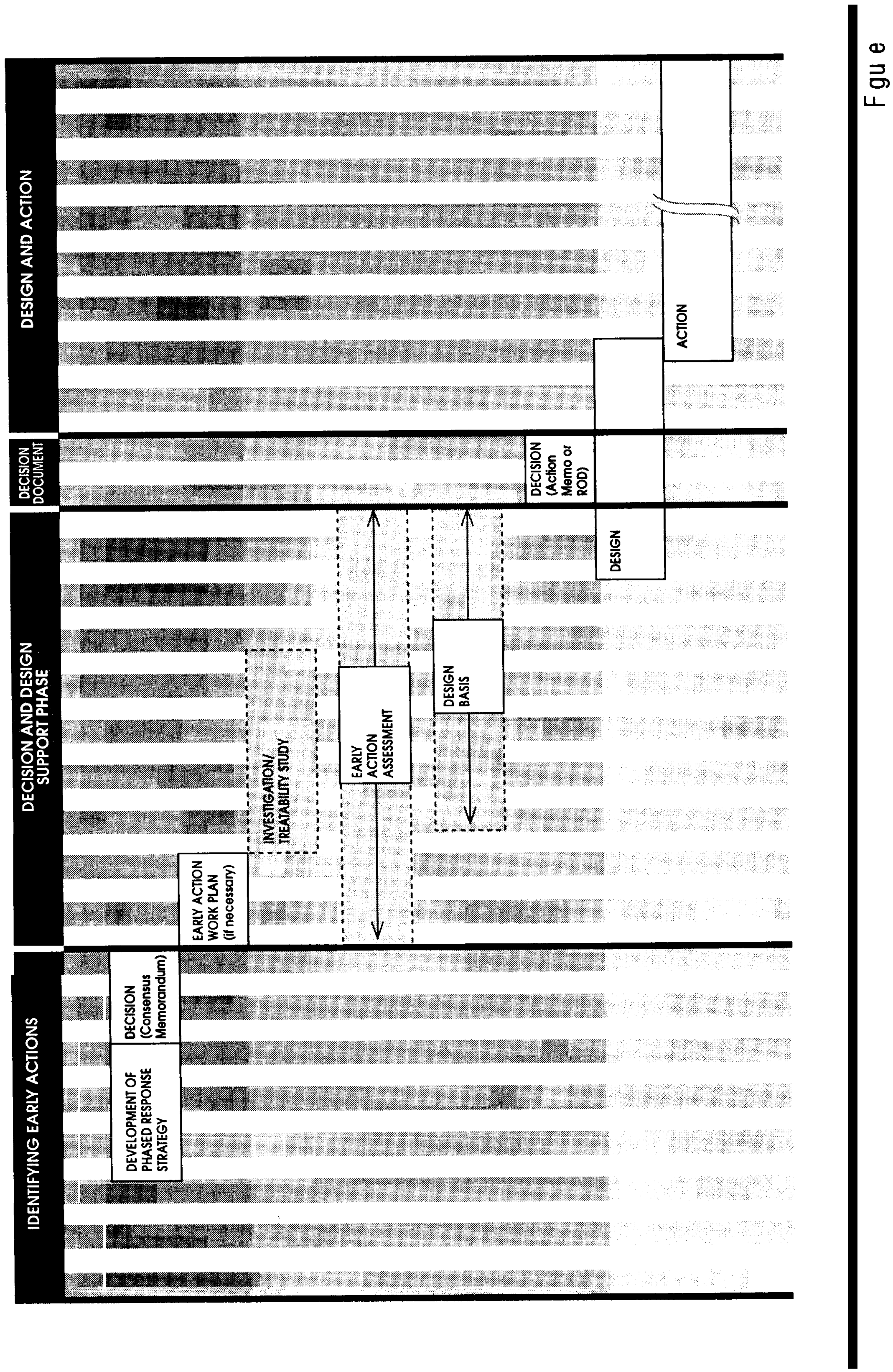
Forming a cooperative approach with the regulatory agencies will in some instances not be straightforward. Past working approaches, the requirements/limitations of an FFA, and differing philosophies of remediation can affect the formation of cooperative relationships. However, the benefits of cooperatively achieving a phased response should be sufficient incentive to overcome most difficulties and allow appropriate compromises in the interest of progress.

Although retaining a cooperative relationship is good, it does not absolve DOE from remaining consistent with FFAs; permits under RCRA/Hazardous and Solid Waste Amendments, Clean Water Act, or other authorities; and administrative orders issued by states or EPA. It is critical, therefore, when negotiating orders or agreements, or applying for permits, that DOE and the regulatory agencies build in the flexibility needed to allow streamlining of actions, while still remaining consistent with CERCLA and the NCP.

The CERCLA process for early actions is structured differently than the process for a comprehensive RI/FS/RD/RA. Figure 1 of the Introduction shows the process as it is presented and discussed in this guidance. The listing below describes in broadest terms where the various stages are addressed in the document.

Identifying Early Actions Phase	Module 1 Module 2	Phased Response Strategy Contingent Removal Action Approaches
Decision and Design Support Phase	Module 3	Time-Critical Removal Actions
Decision Document Phase	Module 4	Non-Time Critical Removal Actions and Early Remedial Actions

The Decision and Design Support Phase is where the processes differ most markedly. In the comprehensive RI/FS/RD/RA process, this phase includes only the RI/FS and Proposed Plan, with no design efforts under way (because the remedy has not yet been selected). In order to streamline the early action process, this document encourages beginning the design efforts as early as practicable, during the efforts to reach the remedy selection decision, rather than waiting until the Decision Document has been signed. This is possible because the specific actions to be undertaken are less uncertain than during an RI/FS. Module 4 explains the advantages of this approach and how it can be implemented.


IDENTIFYING EARLY ACTIONS
DECISION AND DESIGN SUPPORT PHASE
DECISION DOCUMENT
DESIGN AND ACTION
DEVELOPMENT OF PHASED RESPONSE STRATEGY
DECISION (Consensus Memorandum)
EARLY ACTION WORK PLAN (if necessary)
INVESTIGATION/ TREATABILITY STUDY
EARLY ACTION ASSESSMENT
DESIGN BASIS
DECISION (Action Memo or ROD)
DESIGN
ACTION
F gu e

The following excerpt from the NCP Preamble illustrates that it supports the development and implementation of a Phased Response by means of remediation.

Federal Register/Vol. 55, No. 46
Thursday, March 8, 1990
Rules and Regulations
(Pages 8703-8706)

3. *Management principles.* Many commenters urged greater emphasis on the program management principles of a bias for action and streamlining that appeared in the preamble to the proposed rule. These commenters generally believe application of these principles would expedite cleanups and maximize reductions in risks to human health and the environment.

Many commenters advocated applying the streamlining principle to **screen** unnecessary /duplicative/impracticable remedial action alternatives and to ensure that the detail of the RI/FS for a site is commensurate with the overall risk posed by the site. Several cornmenters stated that an application of the bias for action principle would encourage early action to prevent further migration of contamination pending the completed remedial action. Consistent with this principle, a commenter suggested revising the first sentence of § 300.430(a) to state that the purpose of the remedial action process is to reduce risk "as soon as site data and information make it possible to do so. " EPA agrees with this recommendation and has added this language in a new second sentence in § 300.430(a).

EPA **concludes that study/investigation should be focused whenever possible.**

Early risk reduction is the purpose of remedial action process.

EPA has incorporated the program management principles into today's rule in response to the supportive comments received. EPA believes placement of these principles into today's rule promotes making sites safer and cleaner as soon as possible, controlling acute threats, and addressing the worst problems first.

One commenter argued that EPA lacks the requisite statutory authority to promulgate principles such as a bias for action. In response, EPA was given considerable discretion in CERCLA Section 104(a)(l) to decide what action to take in response to releases of hazardous substances. In the NCP, EPA has set out provisions for taking various types of removal and remedial actions. Thus, it is clearly within EPA's discretion to decide how to balance the need for prompt, early actions against the need for definitive site characterization. The bias for prompt action is wholly consistent with Congress' concern that CERCLA sites be addressed in an **expeditious** manner. Indeed, in CERCLA Section 121(d)(4)(A), Congress specifically contemplated early or interim actions by allowing EPA to waive ARARs in such cases. Further, a bias for action is consistent with EPA's long-standing policy of responding by distinct operable units at sites as appropriate, rather than waiting to take one consolidated response action.

EPA **has authority under Section 104 to ensure a bias for action.**

Phasing of early actions with longer term actions is consistent with CERCLA.

The 1985 NCP originally codified this policy that remedial actions may be staged through the use of operable units.

EPA received comments urging the Agency to strengthen its commitment to early site action through expanded use of removal actions at NPL sites without foreclosing more extensive remedial actions. In response, EPA encourages the taking of early actions, under removal or remedial authority, to abate the immediate threat to human health and the environment. Early actions using remedial authorities are initiated as operable units. In deciding between using removal and remedial authorities, the lead agency should consider the following: (i) The criteria and requirements for taking removal actions in today's rule; (ii) the statutory limitations on removal actions and the criteria for waiving those limitations; (iii) the availability of resources; and (iv) the urgency of the site problem.

EPA encourages use of early actions.

EPA expects to take early action at sites where appropriate and to remediate sites in phases using operable unit as early actions to eliminate, reduce or control the hazards posed by a site or to expedite the completion of total site cleanup. In deciding whether to initiate early actions, EPA must balance the desire to definitively characterize site risks and analyze alternative remedial approaches for addressing those threats in great detail with the desire to implement protective measures quickly. Consistent with today's management principles, EPA intends to perform this balancing with a bias for initiating response actions necessary or appropriate to eliminate, reduce, or control hazards posed by a site as early as possible. EPA promotes the responsiveness and efficiency of the Superfund program by encouraging action prior to or concurrent with conduct of an RI/FS as information is sufficient to support remedy selection. These actions may be taken under removal or remedial authorities, as appropriate.

EPA promotes the use of concurrent actions (e.g., removal, remedial).

To implement an early action under remedial authority, an operable unit for which an interim action is appropriate is identified. Data sufficient to support the interim action decision is extracted from the ongoing RI/FS that is underway for the site or final operable unit and an appropriate set of alternatives is evaluated. Few alternatives, and in some cases perhaps only one, should be developed for interim actions. A completed baseline risk assessment generally will not be available or necessary to justify an interim action. Qualitative risk information should be organized that demonstrates that the action is necessary to stabilize the site, prevent further degradation, or achieve significant risk reduction quickly. Supporting data, including risk information, and the alternatives analysis can be documented in a focused RI/FS. However, in cases where the relevant data can be summarized briefly and the alternatives are few and straightforward, it may be adequate and more appropriate to document this supporting information in the proposed plan that is issued for public comment. This information should also be summarized in the ROD. While the documentation of interim action decisions may be more streamlined than for final actions, all public, state, and natural resource trustee participation procedures specified elsewhere in this rule must be followed for such actions.

Only limited data are needed to support early actions.

Risk assessment should be focused to support early action. A completed baseline risk assessment is unnecessary; qualitative risk information needs only to demonstrate that action is necessary.

Several commenters endorsed placing the expectations and management principles into the rule to avoid collection of unnecessary data and evaluation of too wide a range of alternatives. Without providing a specific example, a commenter noted that many past Superfund cleanups have experienced the opposite of a bias for action by including unnecessary and costly data collection and report preparation without reaching conclusions on the recommended site remediation. EPA agrees that site-specific data needs, the evaluation of alternatives and documentation of the selected remedy should reflect the scope and complexity of the site problems being addressed. This principle, derived from the streamlining principle discussed in the preamble to the proposal, has been incorporated into today's rule. The goal, expectations, and management principles incorporated into the rule, promote the tailoring of investigatory actions to specific site needs. On a project-specific basis, recommendations to ensure that the RI/FS and remedy selection process is conducted as effectively and efficiently as possible include:	**Focusing opportunities is appropriate for any phased response.**
1. Focusing the remedial analysis to collect only additional data needed to develop and evaluate alternatives and support design. 2. Focusing the alternative development and screening step to identify an appropriate number of potentially effective and implementable alternatives to be analyzed in detail. Typically, a limited number of alternatives will be evaluated that are focused to the scope of the response action planned. 3. Tailoring the level of detail of the analysis of the nine evaluation criteria (see below) to the scope and complexity of the action. The analysis for an operable unit may well be less rigorous than that for a comprehensive remedial action designed to address all site problems. 4. Tailoring selection and documentation of the remedy based on the limited scope or complexity of the site problem and remedy. 5. Accelerating contracting procedures and collecting samples necessary for remedial design during the public comment period.	
Although the level of effort and extent of analysis required for the RI/FS will vary on a site-specific basis, the procedures for remedy selection do not vary by site. The lead agency is responsible for meeting procedural requirements, including support agency participation, soliciting public comment, developing an administrative record, and preparing a record of decision.	**Remedial selection procedural requirement remain intact with phased response.**

Opportunities when early actions are appropriate.

A more streamlined analysis during an RI/FS may be particularly appropriate in the following circumstances:

Well-defined problems.

1. Site problems are straightforward such that it would be inappropriate to develop a full range of alternatives. For example, site problems may only involve a single group of chemicals that can only be addressed in a limited number of ways, or site characteristics (e.g., fractured bedrock) may be such that available options are limited. To the extent that obvious, straightforward problems exist, they may create opportunities to take actions quickly that will afford significant risk reduction.

Urgency.

2. The need for prompt action to bring the site under initial control outweighs the need to examine all potentially appropriate alternatives.

Alternatives are straight forward and choice is limited.

3. ARARs, guidance, or program precedent indicate a limited range of appropriate response alternatives (e.g., PCB standards for contaminated soils, Superfund Drum and Tank Guidance, Best Demonstrated Available Technology (BDAT) requirements).

4. Many alternatives are clearly impracticable for a site from the outset due to severe implementability problems or prohibitive costs (e.g., complete treatment of an entire large municipal landfill) and need not be studied in detail.

5. No further action or extremely limited action will be required to ensure protection of human health and the environment over time. This situation will most often occur where a removal measure previously has been taken.

Comments varied in their support for the proposed formalization of the operable unit concept. Some commenters encouraged EPA to make full use of the operable unit concept because it could prevent the worsening of some site problems. Other commenters argued against the use of operable units, stating that Congress intended cleanups to focus on sites, not on artificial subdivisions of sites.

The 1985 NCP originally codified the concept that remedial actions may be staged through the use of operable units (former NCP § 300.68(c)). Operable units are discrete actions that comprise incremental steps toward the final remedy. Although EPA agrees that total site remediation is the ultimate objective, often it is necessary and appropriate, particularly for complex sites, to divide the site or site problems for effective site management and early action. Operable units may be actions that completely address a geographical portion of a site or a specific site problem (e.g., drums and tanks, contaminated ground water) or the entire site. They may include interim actions (e.g., pumping and treating of ground water to retard plume migration) that must be followed by subsequent actions that fully address the scope of the problem (e.g., final ground water operable unit that defines the remediation level and restoration time frame). Such operable units may be

taken in response to a pressing problem that will worsen if not addressed, or because there is an opportunity to undertake a limited action that will achieve significant risk reduction quickly. Consistent with the bias for action principle in today's rule, EPA will implement remedial actions in phases as appropriate using operable units to effectively manage site problems or expedite the reduction of risk posed by the site.	**Phased response direction.**
One commenter perceived operable units as a source of inefficiency. This commenter criticized the extended investigative activities associated with the production of multiple and overlapping RI/FSs on operable units for a single site. The commenter advocated completion of RI/FSs within eighteen months, absent unusual conditions, and implementing operable units only where necessary to reduce an immediate risk to human health and the environment. This latter point was supported by another commenter who feared that use of an operable unit may provide a false impression that the project is progressing rapidly and may result in greater cost due to duplication of work.	
In response, EPA has established as a matter of policy the goal of completing RI/FSs (i.e., through ROD signature) generally within 24 months after initiation. EPA agrees that duplication of efforts on RI/FSs should be avoided. However, EPA supports the operable unit concept as an efficient method of achieving safer and cleaner sites more quickly while striving to implement total site cleanups. Although the selection of each operable unit must be supported with sufficient site data and alternatives analyses, EPA allows the ROD for the operable unit to use data and analyses collected from any RI/FS performed for the site. No duplication of investigatory or analytical efforts should occur when selecting an operable unit for a site.	
Although supporting the operable unit concept, one commenter argued that unless EPA alleviates the administrative burdens placed on an operable unit, no bias for action will be realized. Another commenter requested clarification of the procedures required to support the initiation of action prior to completion of the RI/FS for the entire site. This commenter cautioned EPA that encouragement of early action could result in actions being taken without a proper understanding of the site. According to a different commenter, application of the streamlining principle could result in additional and unnecessary costs to potential responsible parties by accelerating contracting procedures and collecting samples necessary for remedial design during the public comment period on the RI/FS and proposed plan. This commenter feared that the samples taken before remedy selection may prove irrelevant to the final selected remedy.	**Risk of early actions and phased response.**
Similarly, some commenters requested guidance on operable units and more specificity on implementing the streamlining concept. Some commenters suggested phased RI/FSs and limiting the collection of data. One commenter added that a properly implemented streamlining approach could result in a more focused RI/FS and would minimize the collection of unnecessary data. This commenter cautioned, however, that poorly	

implemented streamlining could result in insufficient data upon which to base remedy selection, shortened time frames for settlement discussions, or actions that are inconsistent with later remedial actions. In addition, another commenter noted that documentation for the remedial action must be sufficient to support a legal challenge.	**Caution on use of early actions/phased response.**
EPA acknowledges that the program management principles in today's rule are neither binding nor appropriate in every case; they must be applied as appropriate. The streamlining principle supports data collection and alternatives analyses commensurate with the scope and complexity of the site problem being addressed. The principles focus site investigations and alternatives analyses while maintaining the requirement that sufficient information be obtained for sound decision-making. The ROD for an interim remedy implemented as an operable unit does not necessarily require a separate RI/FS but instead can summarize data collected to date that supports that decision. This procedure provides an adequate basis on which to select an interim remedy and thus safeguards against taking premature action and avoids duplication among RI/FSs performed for the site. For guidance on documenting remedial action decisions, including operable units, see the Interim Final Guidance on Preparing Superfund Decision Documents (June 1989, OSWER Directive 9355.3-02).	**Streamlining is optional.**
Some commenters focused on interim actions, implemented as operable units. These commenters stressed the important role of interim action operable units in furthering the bias for action. According to these commenters, EPA's bias for action should be codified in the regulation to communicate that interim measures may be a legitimate component of the remedy selection process. Another commenter agreed that greater emphasis is needed on the importance of interim measures and added that these interim measures should be consistent with the remedial solution likely to be selected.	**Use of interim actions.**
EPA encourages the implementation of interim action operable units, as appropriate, to prevent exposure or control risks posed by a site. Further actions will be taken at the site, as appropriate, to eliminate or reduce the risks posed. EPA is adding to today's rule a statement to clarify that operable units, including interim action operable units, must neither be inconsistent with nor preclude implementation of the expected final remedy.	
One commenter supported the use of interim measures, when appropriate, and argued that the implementation of these measures should not be made contingent on the selection of a final remedy. According to this commenter, the RI/FS process should consider the interim action as one of the possible remedial alternatives to achieve the long-term site goals. Similarly, another commenter stated that it strongly believes that EPA should use its available funds to achieve cleanup at the greatest number of sites, thereby saving resources and reducing overall risks, rather than trying to attain extremely low levels of risk at a smaller number of sites.	
While the bias for action promotes multiple actions of limited scale, the program's ultimate goal continues to be to implement final remedies at	

sites. The scoping section of today's rule has been amended to make clear that the lead agency shall conduct strategic planning to identify the optimal set and sequence of actions necessary to address the site problems. Such actions may include, as appropriate, removal actions, interim actions, and other types of operable units. Site management planning is a dynamic, ongoing, and informal strategic planning effort that generally starts as soon as sites are proposed for inclusion on the NPL and continues through the RI/FS and remedy selection process and the remedial design and remedial action phases, to deletion from the NPL.

Development of a site management strategy should be early.

This strategic planning activity is the means by which the lead and support agencies determine the types of actions and/or analyses necessary or appropriate at a given site and the optimal timing of those actions. At the RI/FS stage, this effort involves review of existing site information, consideration of current and potential risks the site poses to human health and the environment, an assessment of future data needs, understanding of inherent uncertainties in the process, priorities among site problems and the program as a whole, and prior program experience. The focus of the strategic planning is on taking action at the site as early as site data and information make it possible to do so.

Strategy should include the extended project team. This is the basis for the phased response strategy (see Module 1). Consideration of current and potential risks is an appropriate RI/FS activity to help set priorities for site problems.

Final rule: Today's rule includes at § 300.430(a)(l) EPA's goal for remedial actions to protect human health and the environment, maintain that protection over time, and minimize the amount of untreated waste. In addition, the rule also sets out expectations regarding the extent to which treatment is likely to be practicable for certain types of situations and problems frequently encountered by the Superfund program. These expectations place priority on treating materials that pose the principal threats at a given site. The expectations also acknowledge that certain technological, economic, and implementation factors make treatment impracticable for certain types of site problems and that other types of controls may be most effective in these situations. The bias for action and streamlining principles are also printed in the rule.

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Module 1

Phased Response Strategy

Contents

Module 1. Phased Response Strategy

Module 1
Phased Response Strategy

Background

Virtually all site problems at Department of Energy (DOE) facilities have been grouped for remediation, typically into operable units. Rarely does a DOE project manager or designee face a challenge to remediate a single site problem. The requirement is always to develop a strategy to move a collection of site problems through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, eventually remediating all the problems and preparing a portion of the facility for release to its end use. Doing this efficiently and quickly is the challenge.

In any collection of site problems there are likely to be some problems that can be addressed early and others that will require more time for investigation, consideration, phasing with other problem remediations, or even development of new methods or technologies. An efficient strategy will almost always use a sequence of actions, beginning with simple, obvious responses to the more straightforward or urgent problems, and proceeding through more complex responses to the more challenging problems.

This module explains how to identify the most efficient sequence of actions to remediate a collection of site problems. This is called a phased response strategy.

A phased response strategy, which typically should not exceed 10 pages, identifies all the site problems and divides them into those that will be addressed through early actions and those that will have to be addressed through the comprehensive Remedial Investigation/Feasibility Study/Remedial Design/Remedial Action (RI/FS/RD/RA) approach. Identification of candidates for early actions and specific actions to be taken is the primary focus of the strategy. This can be summarized in a simple table or figure.

Specific response actions are started when required according to the strategy. The decision to begin working in earnest on a specific action is documented in a consensus memorandum. A consensus memorandum is a brief statement of intent (approximately 10 pages) that describes the site problem and the scope and general approach for the early action.

Both the phased approach strategy and the consensus memorandum are developed jointly by the extended project team [DOE, the Environmental Protection Agency (EPA), and the state agencies].

Organization

Module 1 is divided into two submodules

- 1.1 Development of a Phased Response Strategy
- 1.2 Development of a Consensus Memorandum

Submodule 1.1 Development of a Phased Response Strategy

Phased Response Strategy

1.1 Development of a Phased Response Strategy

1.2 Development of a Consensus Memorandum

1.1 Development of a Phased Response Strategy

- Identifying All Site Problems in the OU
- Determining Problems That Are Candidates for Early Actions
- Identifying the Authority That Will Be Used for Each Early Action
- Establishing Strategic Objectives for Each Action Identified
- Establishing Consensus on the Phased Response Strategy
- Documenting the Phased Response Strategy

Submodule 1.1 Development of a Phased Response Strategy

Background

A phased response strategy is the primary document used to describe how a sequence of actions will be implemented for a set of site problems. It is the plan for achieving maximum use of early actions to effect risk reduction and to move site problems most quickly to final remediation. The key aspect of a phased response strategy is the consensus that it represents. It should be developed jointly by the extended project team (DOE, EPA, and the State), with DOE in a lead role, and represent an agreement between the major decision makers regarding the best approach to the site problems.

A phased response strategy contains:

- A statement of site problems, including the basis for the site problems (e.g., the current or potential future threat or risk that is posed)
- A table identifying which site problems will be addressed using early actions and which will be left to the final Record of Decision (ROD)
- A list of the type of action (e.g., time-critical removal, early remedial action, final) that will be used to address each site problem
- Brief text explaining the rationale for each assignment
- The primary objectives that each early action will achieve
- A preliminary schedule, through the final remedial action(s)

Organization

Submodule 1.1 discusses the following:

- Identifying and defining site problems
- Determining problems that are candidates for early actions
- Identifying the authority that will be used for each early action
- Establishing strategic objectives for each action identified
- Establishing consensus on the phased response strategy
- Documenting the phased response strategy

In addition, more detailed information is provided in the following notes:

- Note A – Early Action Determinations for Defining a Phased Response
- Note B – Example Process for Early Action Selection of Waste Sites
- Note C – Example Risk Evaluation Methodology
- Note D –Risk Assessment for Early Actions: DOE’s Streamlined Risk Evaluation Process
- Note E – Example Strategy Memorandum Outline
- Note F – Example Phased Response Strategy: Weldon Spring Site Remedial Action Project

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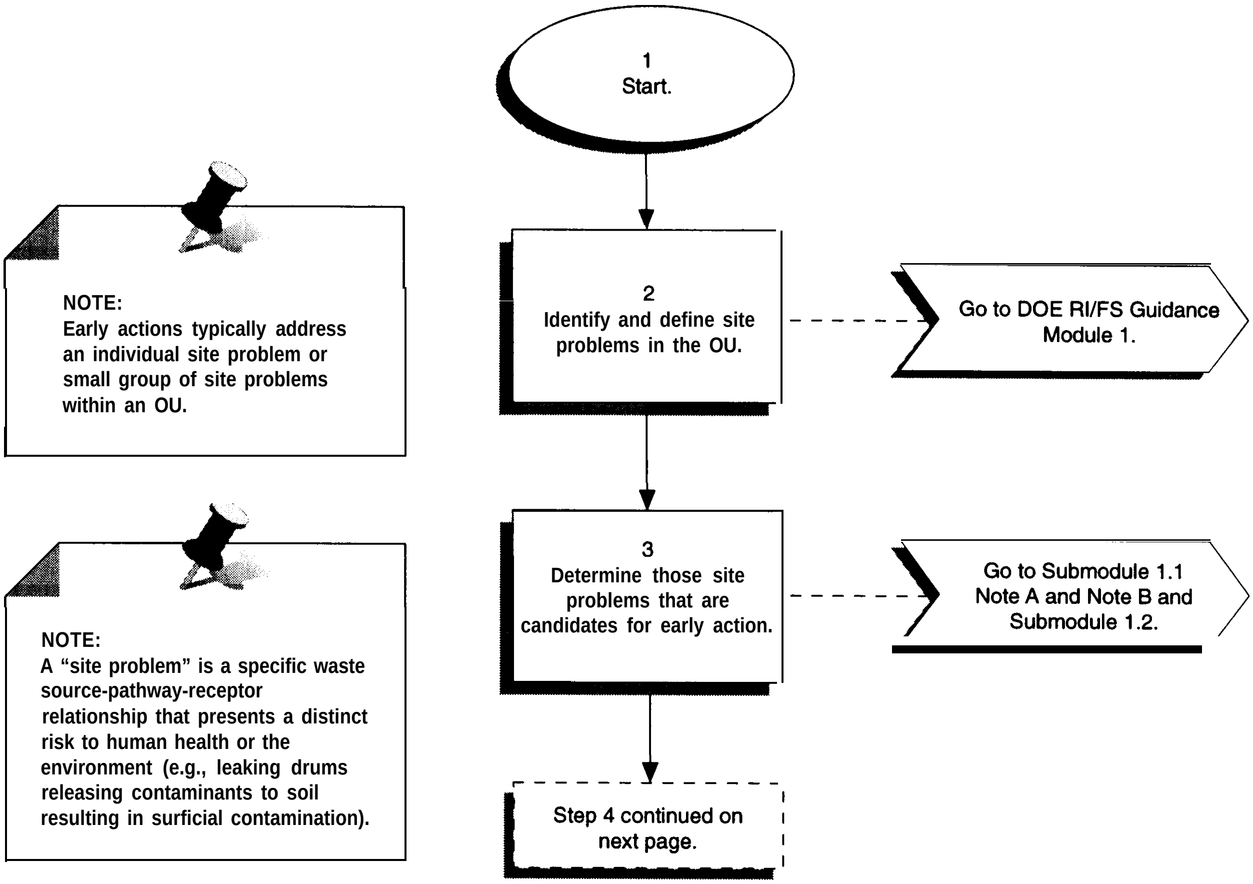
Submodule 1.1 Development of a Phased Response Strategy



Step 1. Start.

Step 2. **Identify and define site problems in the OU. The** first step in establishing a phased response strategy is identifying and defining specific site problems that constitute the operable unit or other grouping that the strategy will address. It is necessary to develop a phased response strategy around an agreed upon list of site problems.

In general, site problems are discrete aspects that may require remediation. Problems should be definable in terms of an environmental medium (e.g., a contaminated groundwater plume, contaminated soil under a building), geographic features (e.g., the creek banks between river mile 27.1 and river mile 28.3), the types of wastes present or suspected (e.g., low-level debris and trash buried in the old landfill, sludge in the retention basin), or the type of waste units that exist (e.g., tanks, drums, sumps).

Examples of potential site problems are:

- Aboveground tanks leaking hazardous substances onto surface soils (source)
- Runoff from contaminated surface soils into a wetland (pathway)
- Presence of contamination in subsurface soil in concentrations and locations likely to cause continuing groundwater degradation (secondary source)

If a conceptual site model has been developed during any RI/FS activities, or will be developed as part of an upcoming scoping effort, it is the most logical place to begin identifying problems. (See DOE's RI/FS guidance, Module 1, Scoping.) The conceptual site model is the primary tool for presenting the known or suspected source-pathway-receptor connections. Site problems are most often developed in terms of sources and pathways and these are the most appropriate for taking early actions (e.g., by removing a source or by shutting off a pathway).

Step 3 . **Determine those site problems that are candidates for early action. The** following criteria are used to determine appropriateness of taking early action:

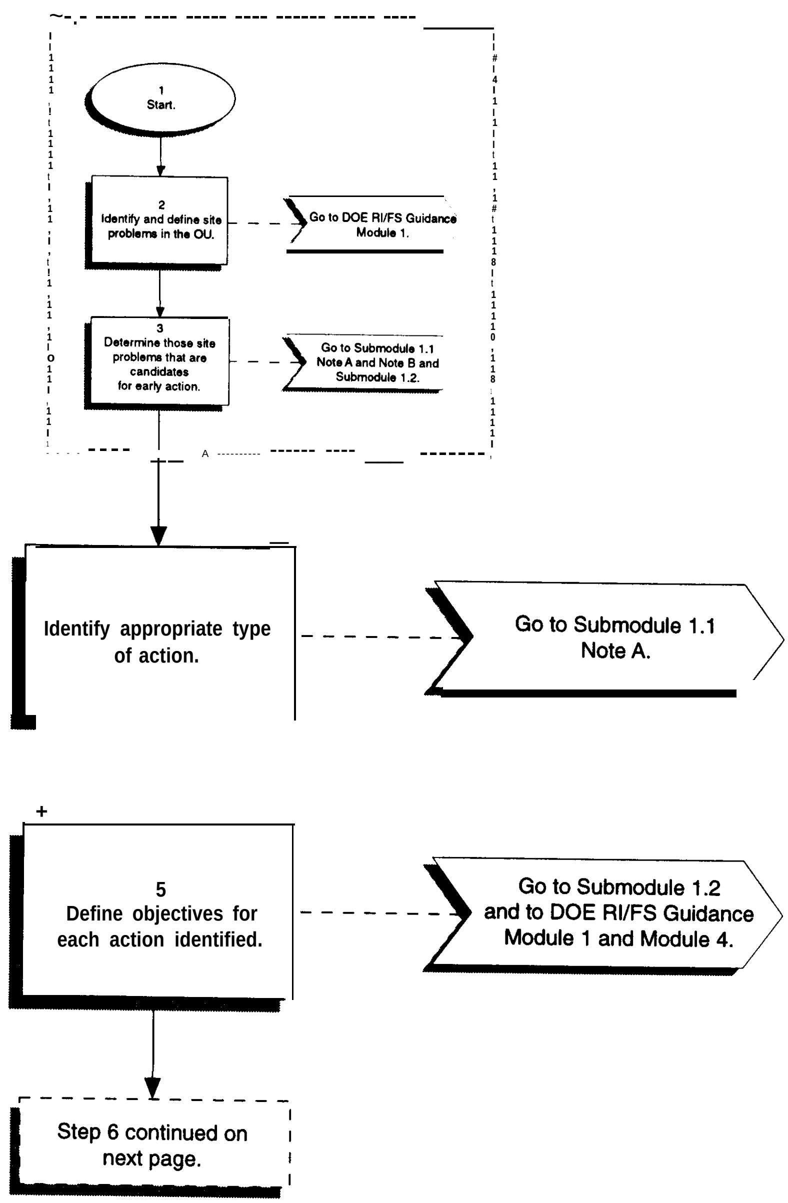
- The site problem presents a risk or threat of release that warrants response.
- The site problem, or specific aspects of it, can be isolated from the remainder of the site problems and can be addressed separately.
- The site problem can be addressed through an early action. That is, there are relatively straightforward steps that can be taken to mitigate or eliminate the problem.

The extended project team decides how these criteria apply for each site problem, often developing a systematic process for applying these (or similar) criteria toward developing a phased response to site problems. Submodule 1.1, Note A provides additional detail on the three criteria. Submodule 1.1, Note B provides an example process developed by

Submodule 1.1 Development of a Phased Response Strategy (cont.)

NOTE:
Check facility-specific Federal Facilities Agreement to determine early actions available for use at each facility.

NOTE:
Objectives for well-defined early actions are similar to remedial action objectives (RAOs).



DOE-Miamisburg, Ohio EPA, and U.S. EPA to identify site problems that are candidates for early action at Mound.

There are also potential negative indications that must be considered. There may be logistical or other considerations, potential deal killers, that hinder or eliminate the possibility of an early action. A primary example is unavailability of disposal or other waste management capacity that would be required by the action. An early action is clearly not feasible if management capacity will have to be developed or otherwise will not be available for years.

Finally, any early remedial action taken under CERCLA Section 106 has to be consistent with the final actions that will follow. This consideration can inhibit or rule out certain early actions. The matrix in Submodule 1.1, Note A also addresses this consideration.

A site problem is a candidate for early action if it meets the three criteria above, presents no deal killers, and will not be inconsistent with final remedies.

Step4. **Identify appropriate type of action.** The authority for conducting the action must be decided (e.g., time-critical removal, early remedial action). The matrix in Submodule 1.1, Note A, provides a general guide on factors to consider when identifying the appropriate type of action. Consensus of the extended project team should be sought. In some instances, the choices may be limited by sitewide agreements.

The types of early actions differ in administrative procedures (e.g., degree of public involvement required, documentation) or substantive requirements [e.g., requirements to comply with applicable or relevant and appropriate requirements (ARARs)]. The choice among actions can be significant, but in many instances, the specific type of early action selected is not of overriding importance. All of the various types of removal and remedial actions allow opportunities for streamlining and obtaining the advantages described in the Introduction.

Step 5. **Define objectives for each action identified.** Clear objectives should be established for each action in the phased response strategy. The objectives should identify how the early action will contribute to the overall remediation of the site.

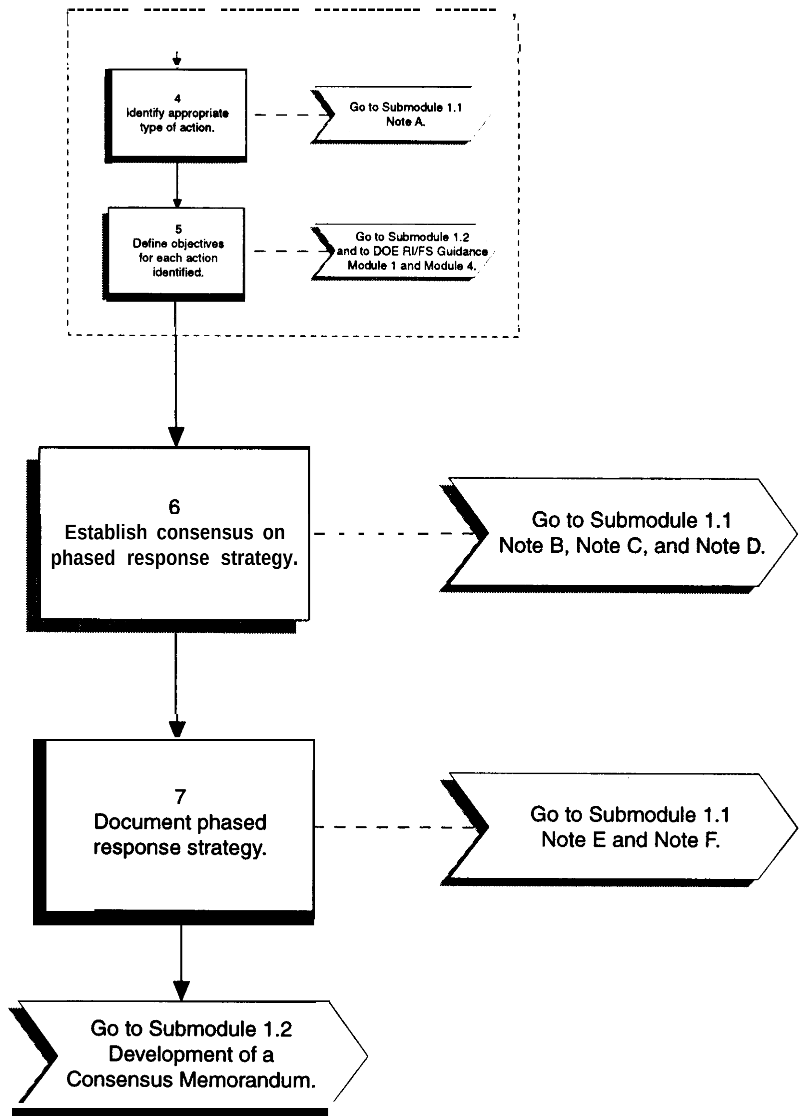
The objectives are similar to preliminary remedial action objectives (RAOs) established during an RI/FS (see DOE's RI/FS guidance, Module 1, Scoping).

Example objectives are:

- Remove the leaking underground waste tanks and all visibly contaminated subsurface soils. The action will not involve removing the tanks that do not appear to be leaking, but will include pumping wastes from those tanks and flushing the tanks.

- Identify, stabilize, and stake all radioactive hot spots within the unfenced portion of the OU. Hot spots are defined as areas contaminated above the agreed upon interim background levels established in [reference document (e.g., the facility-wide Sampling and Analysis Plan)]. Hot spots within the fenced areas will be addressed through a later action.

Submodule 1.1 Development of a Phased Response Strategy (cont.)



NOTE:
To be effective, phased response strategies must reflect a consensus of the project team.

- Install runon/runoff controls to prevent erosion-contminated flows from reaching [name receptor]. If possible, control will be established without capping the contaminated areas, which would lead to increased wastes to be managed at final remediation.

In formulating objectives there is value in listing not only the site problems to be addressed and the actions to be taken, but also problems that will not be addressed (e.g., “these” hot spots, but not “those” hot spots). Such negative scope statements sharpen the focus of the actions,

Step6. **Establish consensus on phased response strategy.** A phased response strategy must reflect a consensus of the extended project team, particularly the regulators. One or two meetings and later exchanges of the drafts are appropriate methods for reaching consensus. It is necessary to achieve consensus on all steps to this point, including:

- **Method(s) for and identification of site problems and candidates for early actions.** While health risk is one factor that may be used for identifying site problems and candidates for early action, it is not the only factor. Others include historical knowledge, presence or lack of a complete exposure pathway, existing site standards [e.g., Preliminary Remediation Goals (PRGs)], site precedent, and background levels. Submodule 1.1, Note B provides an example of one method designed by an extended project team for identifying early actions. In addition, Submodule 1.1, Note C provides an example of a risk evaluation methodology agreed to for identifying site problems.

- **Identification of objectives for each early action.** Several issues, if resolved, can be used to establish objectives for early actions. These include development of interim cleanup levels, identification of applicable ARARs, designation of land use, and use of institutional controls. Additionally, agreement for the use of innovative technology can help establish whether the objective of an early action is, for example, specific cleanup or demonstration. Submodule 1.1, Note D provides additional information on processes that could be used to help establish remedial action objectives on the basis of risk assessment approaches for early actions.

- **Identification of site problems deferred to a comprehensive RI/FS/RD/RA.** Factors that may lead to deferring a site problem to the comprehensive RI/FS/RD/RA include unresolved issues such as disposition of remediation wastes, inability to reach consensus on what constitutes a site problem, inability to identify an objective for an early action, or inability to identify a potential response (e.g., unavailability of technology).

At this point, issues in each step should be resolved to the extent possible. Any unresolved issues weaken the strategy and can eventually result in delays or even abandonment of organized early action effort. Only general consensus is required at this point; more detailed consideration of each of these points is possible during the development of the consensus memorandum that initiates each early action.

Step 7. **Document phased response strategy.** A separate strategy document is not required. A phased response strategy can be documented in whatever existing documents are

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appropriate, such as a site management plan or site strategy document. Where no existing documents can serve, a separate memorandum can be developed to summarize the phased response strategy.

The phased response strategy should be kept as short as possible (10 pages or less may be a reasonable target). Most of the information should involve simple declarative statements regarding what has been agreed upon. A key element is a table or flowchart that presents all of the site problems and the action(s) envisioned (early or final) for each problem, and that indicates any site problems for which an agreed upon course of action has not been established.

The phased response strategy should also acknowledge any unresolved issues (e.g., land use) and provide working assumptions that will guide implementation of the early actions until better information is available. For example, an assumption might state, "On the portion of the site that will remain under DOE control for the foreseeable future, the land use will be assumed to be industrial, until a final land use decision is made in the final ROD. "

Submodule 1.1, Note E provides an example outline for a phased response strategy memorandum. Submodule 1.1, Note F provides an example phased response strategy.

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Note A. **Earlv Action Determinations for Definining a Phased Response.**

The following matrix presents the criteria which identify appropriate candidates for the various CERCLA response actions. It is arranged into the three categories identified in Step 3: Threat of Release/Risk, Potential Response, and Scope of Response. It also discusses consistency with final remedies, an important modifying consideration in identifying candidates for early action.

In addition to identiying candidates for early action, the phased response strategy must identify the appropriate type of action for each site problem. Each type of action (e.g., time-critical removal, non-time-critical removal, early remedial) has distinguishing characteristics. These characteristics are the main point of interest in the matrix that follows.

The matrix was developed largely from the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) preamble and final rule, as well as interpretations from EPA guidance documents. It can serve as a basis for discussions among the extended project team for appropriate use of early actions in a phased response.

Note A: Early Action Determinations for Defining a Phased Response (continued)

Criteria	Factor	Non-Emergency Removal Actions		Remedial Actions	
		Time Critical	**Non-Time Critical**	**Early**	**Final**
Threat of Release/Risk	**Nature of Threat**	Threat from site problems substantial enough to warrant response.	Threat from site problems substantial enough to warrant response.	Threat from site problems that almost certainly will exceed the final cleanup standards for site problems. For example, high levels of contamination flowing directly into a creek.	Threat from site problems that have been shown through the RI or risk assessment to exceed final remediation levels or to exceed final ARARs.
Threat of Release/Risk	**Objectives**	Reduce risks from site problems to levels consistent with final cleanup standards (if they are clear or defined) or to remove immediate threats.	Reduce risks from site problems to levels consistent with final cleanup standards (if they are clear or defined). Site problems selected for action may be those that (1) require near-term action, (2) are most amenable to remediation, (3) are least hampered by lack of site information, (4) are least encumbered by ARARs or other regulatory requirements, or (5) have a remediation decision that will be least controversial. Risk is one factor in this range of considerations.	Same as non-time-critical removals.	All long-term risks from site problems to human health or the environment are remediated.

Submodule 1.1 Notes on Development of a Phased Response Strategy (continued)

		Non-Emergency Removal Actions		Remedial Actions	
Criteria	**Factor**	**Time Critical**	**Non-Time Critical**	**Early**	**Final**
Threat of Release/Risk	**Certainty of Threat**	Threat supported largely by available data; limited data collection may be required to determine extent of threat.	Available information is typically sufficient to support the need for remediation. Additional information is often required to establish the extent of the threat or to optimize the envisioned action.	Same as non-time-critical removal.	RI/FS evaluates all potential (or remaining) threats and discusses their certainty as part of final remediation decision. Threats are certified by a baseline risk assessment.
Potential Response	**Implementability Considerations, Including Waste Management**	Readily available equipment, waste management, and other logistical issues can be resolved before the end of a 6-month planning period. Waste management often limited to interim storage or available onsite or commercial capacity. Development of dedicated treatment, storage, or disposal capacity is generally not feasible.	Implementability requirements can be up to the level of complication involved in final remedies. ARARs and other regulatory requirements can be met to the degree practicable or waived (temporarily) thus making implementability greater than for the same action as final. Development of dedicated treatment, storage, or disposal capacity may be feasible.	Same as for non-time-critical removal.	Potentially, any level of implementability challenges can be accommodated. An exception is absolute requirements, such as disposal needs for which no option can be identified or remediation for which no feasible alternative exists. Planning time to identify and resolve implementability problems is factored into ROD.

Criteria	Factor	Non-Emergency Removal Actions		Remedial Actions	
		Time Critical	Non-Time Critical	Early	Final
Potential Response	**Evaluation Needed**	Six-month planning horizon allows evaluation of the alternative(s) being considered, but detailed evaluation is not required. Draft Action Memorandum explains alternative(s) in terms of implementability, effectiveness, and cost. No comparative evaluation is required (e.g., only one alternative may be considered).	More formal evaluation of alternatives in EE/CA is required, but this cm focus on a few alternatives.	Evaluation is in the Focused Feasibility Study (FFS). The nine criteria in the NCP are the basis of the evaluation. No comparative evaluation is required (only one alternative may be considered).	Detailed evaluation of a range of alternatives, including the no-action alternative, is required in the FS. Both a detailed analysis and a comparative analysis of the alternatives generally are conducted. The nine criteria in the NCP are the basis for the evaluation.
Potential Response	**Consistency with Final Remedy**	Some consideration of consistency with potential final actions may be possible during the limited time available for planning. Such consistency does not stop action. Actions that would clearly inhibit or render much more difficult any of the potential final actions should be avoided.	Consideration of consistency with potential final actions should be given significant consideration during the planning for the action. Consistency can be a reason to delay action until final ROD because of the lower urgency of the situation. Actions that would clearly inhibit or render much more difficult any of the potential final actions should be avoided.	Same as non-time-critical removal.	Not applicable.

Criteria	Factor	Non-Emergency Removal Actions		Remedial Actions	
		Time Critical	Non-Time Critical	Early	Final
Scope of Response	**Investigation Possible/Required**	Some investigation to clarify critical aspects of the site problem(s) is typically possible and/or necessary. Not necessary to establish quantitatively the risks involved or the potential for the envisioned action(s) to meet ARARs.	An LFI is commonly necessary. A baseline risk assessment is not required, although a qualitative risk assessment is required to support the decision to take action. Limited investigation to support the design (including development of contingency plans) is typically required.	Same as non-time-critical removal.	Required investigation is driven by the need to (1) develop a conceptual model of the site; (2) complete a baseline risk assessment and ARARs analysis; (3) develop and analyze a complete range of alternatives; and (4) provide adequate protection to worker health and safety and the environment during remediation. Generally, more data are needed to support all of these purposes than would be required simply to identify and implement the likely best remediation approach.

Criteria	Factor	Non-Emergency Removal Actions		Remedial Actions	
		Time Critical	**Non-Time Critical**	**Early**	**Final**
Scope of Response	**Scope of Action**	Limited actions that rely on existing technologies to address well-defined site problems.	Actions that use established or reasonably reliable technologies. Not necessary to address all site problems; a subset of well-defined, immediately remediable problems may be targeted.	Same as for non-time-critical removal.	Actions that remediate all site problems to meet statutory requirements. Because the scope is to address all threats to human health or the environment, long-term and/or difficult remedial actions or actions with limited assurance of success may be necessary.
Scope of Response	**Cost Limits**	Costs are limited by the availability of pre-programmed funds and/or re-prograrnmable funds. DOE is not restricted by CERCLA statutory limits on fund-financed removal actions.	Same as for time-critical removal.	No cost restrictions apply from the statute. Costs are limited by the availability of pre-programmed funds and/or re-programrnable funds.	Same as for early/ interim remedial action.
Scope of Response	**Stakeholder Involvement**	Extended project team consensus on response is required. Public notice prior to the response is usually possible and desirable. Formal public comment period not usually feasible during the 6-month planning, although a comment period is required once the administrative record is available.	Time is available for public involvement. Public comment period required. Draft action memorandum can be made available for public comment.	Time is available for public involvement. Public comment period required. Proposed plan is made available for comment. Administrative record to support decision is required and is made available to the public.	Extensive stakeholder involvement throughout the scoping, investigation, and decision phases is valuable and required.

Criteria	Factor	Non-Emergency Removal Actions		Remedial Actions	
		Time Critical	Non-Time Critical	Early	Final
Scope of Response	**Ability to Tolerate Limited Success of Action**	Degree of success should be more certain than for an emergency removal. Six months are available to increase this likelihood. However, the brief planning horizon frequently means that full success cannot be guaranteed. Partial success scenarios should be considered as reasonable deviations, and contingency plans should be developed as needed. Further site actions, even if delayed until the final ROD, are likely following any time-critical removal.	Success of the limited actions being undertaken should be assured to a reasonable level by the LFI (if any) and by identification of potential deviations and contingency plans. Because the action is not necessarily the final action, some ability exists to tolerate partial success, given that later, final actions are likely and can be used to repair any inadequacy in the initial response.	Same as non-time-critical removal.	Because these are the final actions, success should be relatively assured. Investigation, planning, and design time are not limited. Because it is desirable for the final actions not to have to be followed by any additional actions to repair inadequacies, tolerance of limited success is lower than for any other type of CERCLA action.

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Note B. **Example Process for Earlv Action Selection of Waste Sites.**

Mound has developed a strategy that will aggressively clean up and release portions of the site. A critical step in implementing this strategy is to determine what action, if any, is required at more than 350 potential release sites (PRSs). The agencies plan a phased response, primarily through removal actions. Mound will conduct removal actions at all PRSs that require response. An RI/FS to support a final ROD will be coordinated with the removal action process. Data collected during the evaluation of PRSs and during removal actions will support the RI/FS. DOE will release blocks of land and buildings as removal actions are completed.

The following example illustrates a process used by Mound to categorize PRSs. DOE, U.S. EPA, and Ohio EPA jointly developed the removal site evaluation (RSE) process with technical support from DOE's contractor at Mound. The example illustrates the use of the RSE process for determining whether a removal action is necessary at a PRS.

Several features of the RSE process should be noted:

- The RSE process has only two outcomes – a PRS either requires a response action or it does not.
- The RSE process uses surrogates for quantitative risk (e.g., historical knowledge, presence of complete exposure pathways, PRG levels) to support the development of a "consensus memorandum. " Thus, only qualitative evaluations of risk are used to support the need for the removal actions. Quantitative risk (i.e., a baseline risk assessment) will support development of a final ROD when the RI/FS is completed.
- The process integrates stakeholders. The Mound core team will ask stakeholders to comment on the team's recommendation for each PRS. After the stakeholders have commented, the agencies will sign a "consensus memorandum" to document the action/no action decision.

Removal Site Evaluation (RSE) Process

1.1 The purpose of the RSE Process is to:

1) determine site uncertainties, potential data needs, and ultimately the appropriate response action for each PRS; and

2) communicate the recommendations of the core team to the stakeholders and provide a forum to receive their input.

The core team is defined as DOE-MB, U.S. EPA Region V, and Ohio EPA.

The extended project team developed a process flow diagram to evaluate the individual PRS, determine the appropriate response action, and solicit stakeholder input, (Figure 1). The RSE process will be the primary mechanism by which the core team will establish whether a PRS represents a site problem.

The extended project team includes DOE-HQ, Ohio Department of Health, and DOE-MB's contractors, in addition to the core team.

Four elements must be present for a PRS to be considered a potential site problem:

1) a source of contamination,
2) a release mechanism,
3) a current or future exposure pathway/route, and
4) a receptor(s).

Definition of site problem.

For some PRSs it will be obvious that there is, or is not, a site problem. In other cases, this determination will be less clear and the development of a conceptual site model will be useful in evaluating if a complete exposure pathway exists. If a complete exposure pathway does exist, then risk-based analysis may be required to determine if the PRS poses an unacceptable risk.

When a risk-based approach may be necessary.

During the RSE process the core team will categorize the PRSs in the following groups, thus determining the next steps:

1) sites that require no further action (NFA) based on existing information (i.e., no problem exists at the site);
2) sites for which a response action is warranted based on existing information (i.e., a problem does exist); and
3) sites for which there is insufficient information available to make a determination (i.e., not sure if there is a problem).

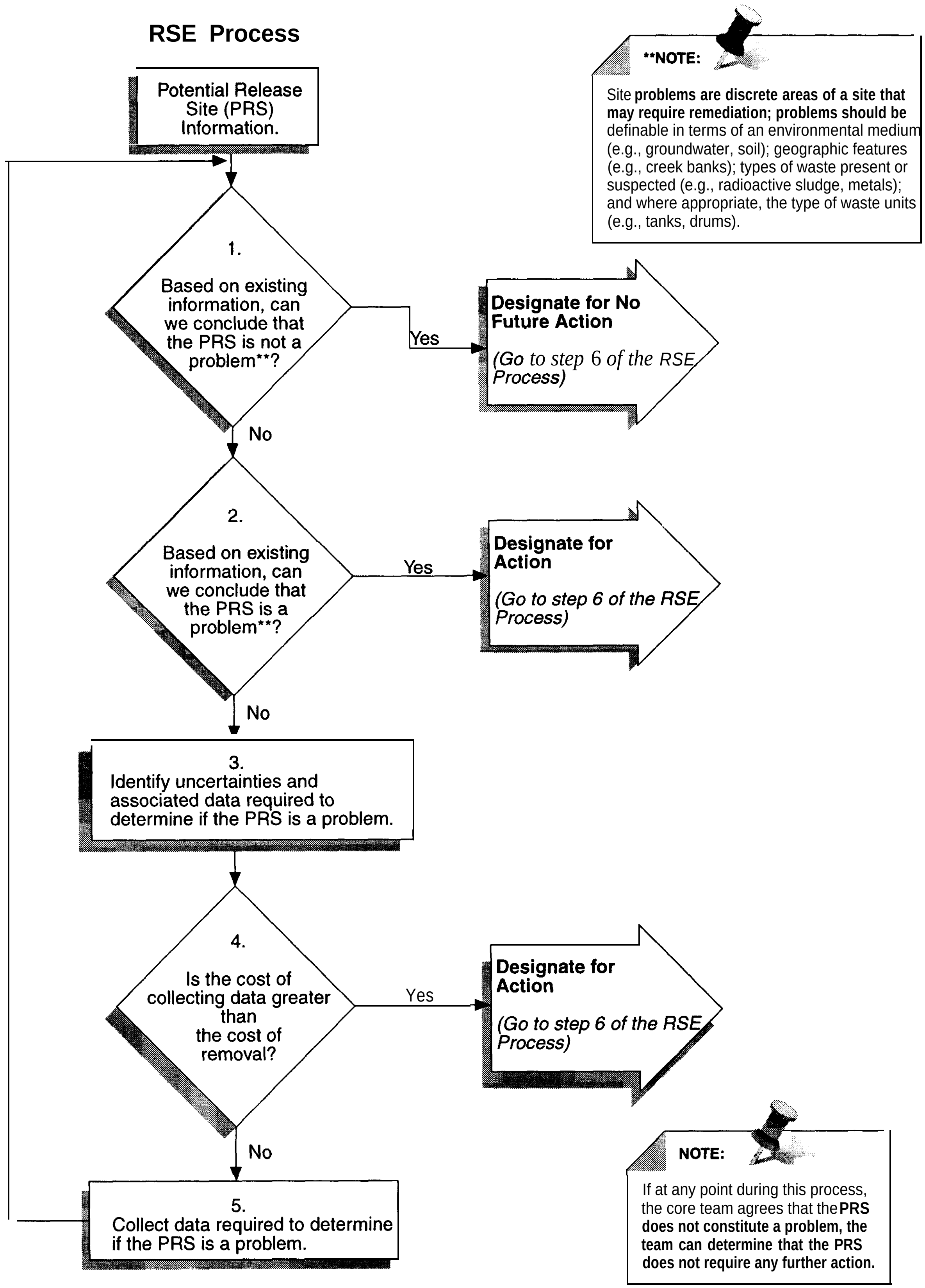
Categories for PRSs.

2.1 Description of RSE Plow Diagram

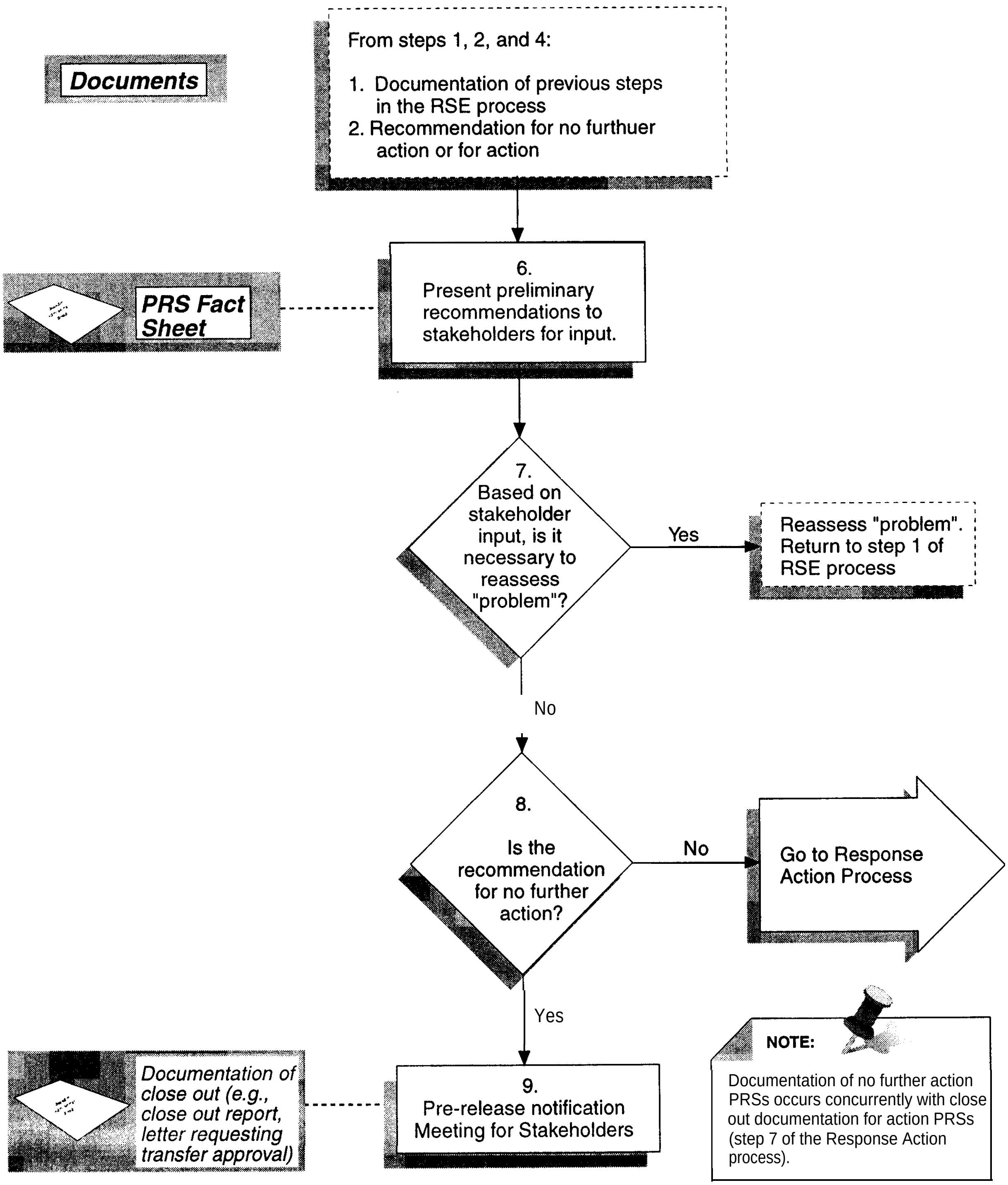
The RSE process developed by the Mound team is described below and illustrated in Figure 1. *[Note; All PRSs within a geographical area being evaluated for release will be run through Steps 1 and 2, and where appropriate 3, before proceeding to Steps 4 and 5.]*

1. Evaluate existing information to determine if the PRS is not a site Problem –This step may be straightforward and obvious. There are a number of criteria that the core team can use to determine that a PRS is not a site problem, based on common sense factors. Examples include:	**Evaluation to determine whether PRS requires no further action.**
• Historical knowledge;	
• Lack of a complete exposure pathway (current or future);	**Risk-surrogates.**
• Existing site standards;	
• Background (either naturally occurring or anthropogenic); and	
• Precedent.	
Risk information also may be used to initially designate a PRS as an area that is not a site problem.	
The core team may decide that the development of a conceptual model is necessary to evaluate if a complete exposure pathway exists. If a complete exposure pathway does exist, or if uncertainty exists as to whether a NFA designation is appropriate, proceed to Step 2 for further evaluation. If the core team determines that the site is not a problem, that PRS will be designated for NFA, pending stakeholder consensus. Skip to Step 6 in the RSE process.	
2. Evaluate existing information and data to determine if the PRS is a site Problem–This step also may be straightforward and obvious, and the core team can use the common sense criteria listed in Step 1 to designate a PRS as a site problem. Similarly, the core team may decide that development of a conceptual site model during this step is necessary to define the problem. If the core team concurs that data and information for the PRS clearly indicate that conditions warrant a response action, then proceed to Step 6 in the RSE process. Further evaluation to determine specifics for implementing a response action, if needed, will be conducted as part of the response action process (Section 3).	**Evaluation to determine if a PRS is a problem requiring action.**
If all four elements of a complete exposure pathway are present, but the degree of risk posed is uncertain, further data collection, field characterization, and/or more quantitative risk evaluation may be required. Proceed to Step 3.	

3. <u>Identify uncertainties and data needs</u> –For PRSs where the existence of a site problem is uncertain, the core team will develop a conceptual site model. The conceptual site model summarizes everything that is known about the PRS, identifies probable and possible pathways and receptors, and identifies areas of uncertainty (e.g., addresses whether pathways are complete and if contaminant concentrations exceed acceptable levels). Based on the conceptual site model, the core team will conduct an evaluation of the uncertainties and will identi~ what data are needed to determine if the PRS is a site problem.	**Data needs identified for further assessment.** **How uncertainties will be managed.**
4. <u>Compare data collection costs to removal costs</u> – For some PRSs (particularly small sites) it may be less expensive to perform a response action than to collect sufficient data to determine if a problem exists. The core team will informally compare the cost of data collection to the expected cost of a response action (including disposal costs) before data are collected. If the expected cost of a response action is clearly less than the cost of characterization, the core team will designate the PRS for a response action.	
5. <u>Collect data required to determine if the PRS is a ~roblem</u>– If more data is required to determine if the PRS constitutes a site problem, DOE-MB will collect the necess~ data and the core team will re-evaluate the PRS following the RSE decision logic. *[Note: ~ at any point in the RSE process the core team concludes a PRS does not pose a site problem, the PRS can be categorized for NFA and the core team should skip to Step 6 in the RSE process.]*	
6. <u>Present Preliminary recommendations to stakeholders for input</u> – The core team will present the recommendations developed through Steps 1-5 of the RSE Process (i.e., either to initiate a response action or to take NFA). The data and/or information and the rationale to support each recommendation will be summarized in the format of a PRS fact sheet. The PRS fact sheet will include: • A description of the PRS, including process history; • A photograph of the PRS; • A summary of the data and indicated levels of contamination at the PRS;	**Integrating stakeholders by presenting PRS recommendations.**


RSE Process
**NOTE:
Site problems are discrete areas of a site that may require remediation; problems should be definable in terms of an environmental medium (e.g., groundwater, soil); geographic features (e.g., creek banks); types of waste present or suspected (e.g., radioactive sludge, metals); and where appropriate, the type of waste units (e.g., tanks, drums).
Potential Release Site (PRS) Information.
1. Based on existing information, can we conclude that the PRS is not a problem**?
Yes
Designate for No Future Action
(Go to step 6 of the RSE Process)
No
2. Based on existing information, can we conclude that the PRS is a problem**?
Yes
Designate for Action
(Go to step 6 of the RSE Process)
No
3. Identify uncertainties and associated data required to determine if the PRS is a problem.
4. Is the cost of collecting data greater than the cost of removal?
Yes
Designate for Action
(Go to step 6 of the RSE Process)
No
5. Collect data required to determine if the PRS is a problem.
NOTE:
If at any point during this process, the core team agrees that the PRS does not constitute a problem, the team can determine that the PRS does not require any further action.

RSE Process (cont.)



• References from which data are summarized; • Conclusions/recommendations of the core team. *[Note: For each Predesignated as a site problem, a problem statement (i. e., a concise statement which describes why the PRS constitutes a site problem) and a conceptual model will be included.]*	
The purpose of this step is to solicit stakeholder involvement early in the process so that their input can be used to help guide program decisions and site remediation strategy. Stakeholders will be asked to review the core team's recommendations, focusing on the problem statement. If stakeholders disagree with the designation of a PRS as either a site problem or as an area requiring NFA, they will be asked to provide input that will either eliminate, create, or modify a problem statement.	**Developing consensus.**
7. Determine whether it is necessarv to reassess "problem" – Evaluate stakeholder input and, if necessary, reassess the PRS through Steps 1-5 of the RSE process. A PRS warrants reassessment under two scenarios: (1) If *stakeholder input eradicates or resolves the problem statement of a PRS.* This situation could occur, for instance, if stakeholders express an interest in a specific land use which consequently eliminates the potential exposure pathway of concern and effectively eradicates the problem statement for that PRS. (2) If *stakeholder input results in a statement of concern or a problem statement for a PRS designated for NFA.* This situation could occur for instance if stakeholders express an interest in a specific land use (e.g., residential) that could result in increased exposures or new exposure pathways. When stakeholder input simply adds to or modifies a problem statement, revisions to the core team's recommendation based on this input will be addressed in the response action process (see Section 3) and a formal reassessment will not be required. For those PRSs that do not require further assessment, proceed to Step 8.	**Resolving disagreements.**

8. <u>Finalize recommendation</u>-At this point in the RSE process, each PRS is either recommended for either (1) a response action or (2) NFA, based on core team consensus. After receiving stakeholder approval, the recommendation is final. If the PRS has been designated as a site problem that requires action, proceed to the response action process (Section 3). If the PRS has been designated for NFA, proceed to Step 9. 9. <u>Conduct a Pre-Release Notification Meeting for Stakeholders</u> – DOE-MB will document the designation for NFA (e.g., develop a close out report for a PRS or draft a letter that requests land transfer approval for a release block) and present the documentation to stakeholders. DOE-MB also will submit the close out documentation to regulators for approval. *[Note: Close out documentation for NFA PRSs occurs concurrently with close out documentation of action PRSs in Step 8 of the response action process.]*	**Develop consensus memorandum.**

Note C. **Example Risk Evaluation Methodologv.** This note provides a summary of the decisions made during the development of the risk evaluation methodology to evaluate PRSs on the basis of human health risk.

As part of developing are moved action-based approach (i.e., a phased response strategy), DOE, U.S. EPA, and Ohio EPA have jointly developed an RSE process to categorize PRSs and to identify candidates for early action at DOE's Mound Plant in Miamisburg, Ohio (see Submodule 1.1 Note D for more detail). The agencies determined that a variety of criteria may be used to categorize a PRS [for early action, further assessment (i.e., deferred), or no-action] including historical knowledge about a PRS, comparison of PRS contaminant concentrations with established cleanup standards, and comparison of PRS contaminant concentrations with background concentrations. A PRS is evaluated on the basis of the risk it poses to human health, only if the PRS cannot be categorized on the basis of these criteria.

To evaluate PRSs on the basis of risk, the agencies jointly developed a risk evaluation methodology that compares the concentration of contaminants at the PRS with risk-based concentrations known as Guideline Values. Guideline Values are similar in concept to PRGs because they represent a risk-based concentration of a contaminant in a specific medium. Hence, the "104 Guideline Value" for a contaminant is the concentration of that contaminant that yields a cancer risk of 1×10^{4} (1 in one million). Calculating Guideline Values requires making multiple assumptions about potential receptors, exposure scenarios, and other parameters typically used to calculate risk.

Reaching consensus on the appropriate Guideline Values was a collaborative effort that involved researching and discussing a wide range of risk-related issues. To address these issues, a team of risk assessment professionals from the three agencies worked cooperatively to generate recommendations for discussion by the sitewide Mound team. Based on the recommendations of the "risk team, " consensus was reached on the following elements, which form the foundation of the risk evaluation methodology:

- Exposure scenarios. Because there is consensus that the future use of the property will be industrial, the risk evaluation is based on two receptors that represent individuals that may be exposed in an industrial setting. These receptors are the outdoor construction worker and the indoor worker.

- Exposure routes. Both the outdoor construction worker and the indoor worker are assumed to ingest small amounts of soil, inhale small amounts of dust from the soil, be externally exposed to possible radiation from the soil, and drink about a quart (1 liter) of water per day from a groundwater well on the property. The outdoor construction worker is assumed to ingest and inhale greater amounts of soil and dust and may also shower in water from a well on the property (possibly inhaling small amounts of vapor while showering).

In general, dermal exposure is not evaluated except for PRSs containing contaminants that are known to be of concern from dermal exposure [e.g., polycyclic aromatic hydrocarbons (PAHs), As, Be, Cd). Surface water exposure is not expected to be a concern. However, if surface water exposure is a risk concern for a specific PRS, Guideline Values based on recreational surface water exposure will be used as a conservative upper bound for screening PRSs.

- Exposure duration and frequency. In accordance with EPA guidance, the exposure duration for the indoor worker is assumed to be 25 years. Because Mound construction projects have historically lasted no longer than 2 to 5 years, an exposure duration of 5 years is used for the outdoor construction worker. Both the outdoor and indoor worker scenarios assume the worker is exposed 8 hours per day, 250 days per year.

- Exposure area and exposure concentration. The sitewide Mound team discussed the reasonable area over which a person could be exposed by working an 8-hour day and agreed to use the precedent of 1/2 acre for screening purposes during the RSE process. The contaminant concentration that is compared with the Guideline Values is recommended to be the 95 percent upper confidence level of the mean concentration over an area of 1/2 acre surrounding the PRS,

  For radiological contaminants reported as "nondetects," the actual laboratory value will be used to compute the exposure concentration. For nonradiological contaminants, nondetects will be estimated as one-half the detection limit as long as there is at least one hit of the contaminant within the exposure area of 1/2 acre. If no hits exist, the contaminant need not be evaluated.

- Risk threshold. If the PRS contaminant concentration exceeds the Guideline Value equivalent to a risk of 10^{-4}, the PRS is a definite candidate for early action. If the PRS contaminant concentration exceeds the Guideline Value equivalent to a risk of 10^{-6}, the PRS is a probable candidate for early action. A 10-b threshold was selected because setting a 10^{-6} risk level for individual contaminants will generally lead to cumulative risks within the 10^{4} to 10^{-6} target risk range. If the PRS contaminant concentration is less than the Guideline Value equivalent to 10^{-6}, the PRS is not a candidate for early action. For noncarinogenic contaminants, the threshold for individual contaminants is a hazard quotient of unity.

Note D. **Risk Assessment for Early Actions: DOE's Streamlined Risk Evaluation Process.**

This note provides the fill text of an Information Brief guidance developed and published by EH-41, DOE's Office of Environmental Policy and Assistance. It presents the risk assessment requirements that must be met to support an early action, the data needed, and four approaches to performing a streamlined risk evaluation (SRE). Because the risk assessment is being used to decide whether to take early action, but not to preclude any potential actions (as opposed to a baseline risk assessment, which may be used to support taking no action), the standard of proof of risk is lower than required to support a full RI/FS/RD/RA process; qualitative and/or comparative approaches are fully acceptable. A main point is that, whatever approach or combination of approaches is taken, it must be the result of a consensus between the regulatory agencies and DOE.

Streamlined Site Characterization
Approach for Early Actions:
Impact on Risk Assessment Data Requirements

Background:	**The U.S. Environmental Protection Agency (EPA) has developed the Superfund Accelerated Cleanup Model (SACM) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to promote increased efficiency and shorter response times in remediating contaminated sites. The SACM approach requires a prompt reduction of risk through removal actions or presumptive remedies. Under the Resource Conservation and Recovery Act (RCRA) corrective action program, EPA also has developed the Stabilization Initiative to reduce site risk, i.e., risk from solid waste management units (S-WMUs) or Areas of Concern (AOCs), by early implementation of institutional control or interim measures. Since actions undertaken by CERCLA and RCRA are risk driven, risk assessments also need to be streamlined to support early response actions (Figure 1). The Streamlined Risk Evaluation (SRE) serves this purpose by assessing risk qualitatively; utilizing site-specific hazard and exposure information, incident reports, and health advisory data; and/or comparing available chemical data to published risk-based concern levels such as preliminary remediation goals (PRGs). A quantitative SRE, similar to a screening baseline risk assessment under RCRA and/or CERCLA, may be used to determine the need for further remedial action after an early action is completed. This Information Brief presents the concepts and data requirements for SREs and explains how the SRE may be used to support a baseline risk assessment** (if **required) to be performed in the CERCLA remedial or RCRA facility investigation project phase. Data needs for SREs should consider time and cost, data useability, and the potential of overestimating risk by the use of assumed data.**
Statutes:	**CERCLA Section 104 (Response Authorities), Section 120 (Federal Facilities), and Section 121 (Cleanup Standards); RCRA Corrective Action Authorities, i.e., Sections 3004(u), 3004(v), 3013, 3005(c)(3), 3008(h) and 7003; and Section 6001 as amended by the Federal Facility Compliance Act (FFCA).**
Regulations:	**40 CFR 300.430(d), 40 CFR 300.430(e); 40 CFR 264.101, 264 Subpart F, and 40 CFR 264 Subpart S proposed rule (55 FR 30798, July 27, 1990)**
Referencess:	**1. "Guidance on Implementation of the Superfund Accelerated Cleanup Model (SACM) under CERCLA and the NCP," OSWER Dir. 9203.1-03, EPA (7/92)** **2. "Presumptive Remedies: Policy and Procedures," OSWER' Dir. 9355.0-47FS, EPA (9/93a)** **3. "Presumptive Remedies: Site Characterization and Technology Selection for CERCLA Sites with Volatile Organic Compounds in Soils," OSWER Dir. 9355. O-48FS, EPA (9/93b)**

4. "Presumptive Remedy for CERCLA Municipal Landfill Sites," OSWER Dir. 9355. O-49FS, EPA, (9/93c)

5. "RCRA Corrective Action Stabilization Technologies Proceedings," EPA/625/R-92/O14 (10/92)

6. "Remedial Investigation/Feasibility Study (RI/FS) Process, Elements, and Techniques," Module 7 Streamlined Approach for Environmental Restoration (SAFER), DOE EH-94007658 (12/93)

Why streamline site characterization?

The benefit of streamlining site characterization is that the process facilitates early actions. Based on lessons learned from over ten years of cleaning up Superfund sites, EPA has found that common remedial actions (presumptive remedies) often can be selected for certain types of sites (EPA 1993a, 1993b, and 1993c). For these site types, or sites where remedial actions are anticipated, characterization and feasibility studies may be streamlined to result in early actions, i.e., implementation of either interim or final remedial actions including the use of presumptive remedies.

Three streamlining initiatives:

1. SACM.

Under SACM, presumptive remedies have been identified or are being considered for these site types: municipal landfills, wood treatment facilities, facilities with volatile organic compounds (VOCs) in groundwater, soil contaminated with VOCs, grain storage facilities, coal gasification plants, and sites contaminated with polychlorinated biphenyls (PCBS). Early actions are not limited to sites on the National Priorities List (NPL). EPA has been emphasizing the use of removal authority under CERCLA Section 104 to require potentially responsible parties to perform early actions even before the sites are listed on the NPL.

2. RCRA stabilization.

For hazardous waste treatment, storage and disposal facilities undergoing RCRA corrective action, EPA is also encouraging the facility owner/operator to conduct focused site characterizations and implement interim measures early in the site investigative phase. Early actions or interim measures are selective in nature, i.e., they are selectively applied to presumptive remedy "candidate" sites and/or high priority sites or SWMUs which pose the most serious site risk or represent the principal threat posed by the facility.

3. **SAFER.**

DOE has developed the Streamlined Approach for Environmental Restoration (SAFER)(DOE 1993), which provides explicit recognition and management of uncertainty, and early selection or decision on the need for remedy or corrective measure. Under SAFER, data quality objectives (DQOs) are used to collect the appropriate data to support a site decision. As the remedial project progresses, previously and newly collected data are continuously being evaluated for uncertainty and adequacy to support making site decision or additional information needs. Implementation of SAFER streamlines the traditional site characterization approach, and allows early implementation of the remedy to address probable site conditions and monitoring of remedy performance to meet remedial action objectives (RAOs).

What are the objectives of an early action? CERCLA and RCRA response actions are driven by the protection of human health andtheenvironment (Figure 1). When a response action is determined to be necessary, early actions can provide a substantial risk reduction. Early actions are implemented with the following primary objectives: Rapid reduction of risks; Control of current or future release and migration of contaminants; Consistency of early action with the anticipated final remedy; Cost and time savings related to site characterization; Early return of the contaminated property to current or reasonably anticipated future uses; and Compliance with regulatory requirements and/or community's concern to result in stakeholders' acceptance.	
Early actions provide the opportunity for the environmental project team members and the stakeholders to have an early agreement on the likely final remedies or anticipated site options. Therefore, the uncertainty with respect to site closeout or permit compliance is likely to be minimized through communications and consensus building among all parties in deciding the need for and/or types of early actions to be conducted.	**The importance of consensus.**
What are examples of early actions or interim measures, and how do they streamline site characterization? An early action can be taken to prevent the release and migration of contaminants. The following examples on early action illustrate the need for a streamlined site characterization approach which could also satisfy risk assessment data needs.	
Example: To prevent release and migration of hazardous wastes or constituents from an uncontrolled landfill, a cover or cap of low permeability and run-on diversion would reduce water infiltration into the wastes and the potential for contaminant leaching from the waste into groundwater (perched groundwater). A leachate collection/removal system would prevent or substantially reduce migration of contaminants away from the landfill, mitigating potential off-site threats to human health and the environment. The site characterization can be streamlined to support early actions by defining the boundary of the cap, locating on-site borrow areas of clean soils for use as capping materials, and establishing the direction of jlow of the contaminated perched groundwater or leachate for the placement of an interceptor trench, e.g., French Drain. These data allow the risk assessor to	**Exposure pathway analysis is a viable approach.** **No pathway = no risk.**

evaluate if all potential releases are controlled and the exposure pathways are incomplete. An early action can be taken to prevent direct exposures that may pose a public health concern. *Eample: For waste piles and highly contaminated soils, actions such as waste removal and placement of a temporary cap and fencing may be taken to prevent direct exposure by humans or ecological receptors. Implementation of these actions would reduce the opportunity for exposure, therefore significantly mitigating the acute (short-term) risks. The site characterization could be streamlined by eliminating the need for extensive characterization of known areas with high contamination ("hot spots"). Resources can be selectively applied to characterize moderate to low contamination areas in order to provide the chemical data for hazard assessment and for comparison with PRGs to determine the need for remediation/corrective measure.*	**Comparison to other standards.**
What kind of risk assessment or risk analysis is relevant to streamlined site characterization to facilitate early actions?	
Streamlined Risk Evaluation (SRE) may be used to identify whether early actions or interim measures are warranted for an individual site or SWMU. The SRE is primarily qualitative, and is used to: • Evaluate whether a site or SWMU poses a substantial (principal) threat to human health and the environment or, if appropriate, • Prioritize sites or SWMUs as candidates for early actions.	**Purpose of an SRE.**
Comparison of contaminant concentration levels with available risk-based and chemical-specific standards, e.g., applicable or relevant and appropriate requirements (ARARs) under CERCLA, is considered to be an SRE. Other example SREs and their specific applications are:	**Four approaches:** **1. Comparison to external standards.**
A Site Conceptual Exposure Model (SCEM) is used to determine if a source of contamination could pose a substantial threat to human health and the environment because the exposure pathways are complete. A SCEM is developed based on a review of relevant site or SWMU-specific information which may include human activity patterns or usage of the contaminated media, topographic, geologic, hydrogeological and meteorological studies in the site area.	**2. Pathway analysis.**
Risk-based action levels or preliminary remediation goals (PRGs) are used to determine if the source(s) of contamination is (are) of concern (hazard evaluation) based on a comparison of contaminant concentrations (if available) with the risk-based action levels or PRGs.	**3. Comparisons to site-specific standards.**

Qualitative or semi-quantitative analysis of alternatives is used to help select an early action/interim measure or a combination of actions or different approaches to the presumptive remedy (e.g., landfill cap designs). The analysis determines the risk reduction capabilities of each approach or alternatives examined.

4. Evaluation of alternatives.

Any combination of the above may be used to evaluate if further remedial actions are needed for a site or SWMU after implementation of an early action or interim measure.

Combinations of approaches.

Although not explicitly identified in the SACM guidance, a quantitative SRE (screening risk assessment) may be conducted, based on default exposure assumptions, for the current or reasonably anticipated future land use (whichever is more conservative) and the most sensitive receptor. The above SRE procedure in reverse can be used to derive PRGs for the site for comparison with site data if published PRGs are not available for the contaminants.

What types of data are required for the SRE?

In order for a streamlined risk assessment to integrate information on hazard (toxicity) and exposure (intake), the data requirements are:

Data needs.

- Hazard – Data that provide information about the identity and concentration of contaminants, as well as historical information concerning spills, releases or hazardous substances or wastes treated, stored or disposed on-site.
- Exposure –Data that support the existence of complete exposure pathways. Examples would include the following: well surveys (number and depths of well); site or regional hydrology, geology and hydrogeology; meteorological data (wind speed and direction, precipitation types and rates, etc.); and distances from the site to potential human and ecological receptors and sensitive environments.
- Incident Report or Health Advisory (optional supporting data) –Injury or damage report of humans, domestic animals and other biological species; health assessment or well designed epidemiological studies based on definitive data or data highly suggestive of a cause-effect relationship; and local or state fish/game advisories.

What are the data quality and quantity requirements for the SRE?

Since most SREs are performed early, the data available to perform the evaluation may be limited. The SRE should be completed quickly to allow timely input into the early action decision. Therefore, the SRE is generally performed with a minimum amount of data or selected data that represent the worst case, based on a current understanding of the site.

Whenever a sampling plan is limited in scope, as in streamlined site investigations, the sampling strategy should be biased toward locations where contaminants are likely to be found and where there is potential for exposure to humans or ecological receptors. For example, sampling should focus on the immediate area of a spill as visually identified by stressed vegetation, staining or aerial photographs.	
The desire to do quick, inexpensive, conservative sampling should be balanced with the costs of grossly overestimating risks and overestimating the requirements of the remedy. Therefore, the appropriateness and the uncertainty associated with the use of limited data to represent site risk in the SRE should be clearly explained to the decision-makers.	
For a controlled landfill with an existing cover and leachate collection system, leachate recovery wells which capture contaminants from a broad area are the preferred sampling locations. This is a more effective use of project resources than sampling the "worst case" locations, (i.e., wells with highest concentrations in limited sampling rounds). Similarly, the soil samples may be systematically collected at the existing cover within the defined cap boundary. The selection of sampling locations may also be based on subsurface field screening techniques, such as soil gas probe, groundwater probe, and organic vapor analyzer.	
The data from a streamlined site characterization study should, at a minimum, meet the requirements of QA2 (QA2 is a verification objective which requires a minimum of 10 percent verification of chemical identity (by an analyte-specific method) of the field or laboratory results, and a minimum of 10 percent verification of quantitation (accuracy of measured concentration)). QA3 may be required per EPA's "Quality *Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures",* Office of Emergency and Remedial Response, April 1990, if a quantitative SRE is anticipated. QA3 assesses the analytical error of the concentration level as well the chemical identity by using vigorous analytical methods and quality assurance.	**If new data are to be collected, higher quality can be specified. Available information may not be at this level. See Submodule 1.1, Note C for a different approach.**
Background data are highly desirable if available. To determine if the detected contaminant is site related or related to SWMUs/AOCs under consideration, either the maximum detected or the mean contaminant concentration (if 3 or more data points are available, preferably 8 to 10 samples as a rule of thumb) is compared with background concentrations. This should be performed for metals and any anthropogenic compounds (e.g., polycyclic aromatic hydrocarbons) of concern. If background data are not available, the site data should be compared with literature values (e.g., *"Element Concentrations in Soils, Conterrninous United States",* U.S. Geologic Survey Professional Paper 1270 by HT Shacklette and JG Boemgen, 1984)	**Use of background data.**

How does project planning help meet the SRE data needs?

ERPM's responsibilities.

Given an understanding of other stakeholders' concerns or expectations, the environmental restoration program manager (ERPM) should identify the goals and objectives (relating to early actions and streamlined site characterization approach) for the project team members (including the risk assessor). Based on the ERPM's goals and objectives, the risk assessor can identify the features or types of deliverables and the level of effort associated with the SRE.

By interacting with other project team members (geologist, hydrogeologist, design engineer, chemist, air quality specialist, etc.), a defensible SCEM can be developed by the risk assessor to identify data types, sample locations, and sampling strategy/design for the SRE.

The importance of scoping.

Clarification of the project objectives in the scoping or project planning phase of a streamlined site characterization study will help focus the SRE data needs. The project objectives relating to presumptive remedy or early action implementation may include:

- Site prioritization for early action;
- Determining if the proposed early action is warranted or is able to substantially reduce risk for a specific site or SWMU;
- Justification of action in Engineering Evaluation/Cost Analysis (EE/CA); and
- The potential short-term risk associated with the early action and the proposed control measures, etc,

Data quality requirements may be driven in part by future uses of the data.

After completion of a removal action or interim measure, an expanded or more quantitative SRE can be performed (in lieu of a baseline risk assessment, if necessary) to determine the residual risk for any complete exposure pathways and the need for further remedial action. To integrate data between project phases properly, the data collection option and QA/QC requirements for the SRE should be consistent with those needed for the remedial investigation or RCRA facility investigation project phase. To facilitate the data integration, QA3 or higher data quality assurance will be required.

Note E. **Example Strategy Memorandum Outline (target 10 pages or less).**

1. Brief summary/description of operable unit (from existing documents)

    Physical description
    b. Ongoing RI/FS, if any
    c. Discussion about early actions allowed under FFS

2. List of problems within operable unit, with a brief description of each and references to other sources of more detailed descriptions

    Site Problem 1
    a. Site Problem 2
    .
    .
    .

3. Description of phased response strategy

    General description of the phased response strategy and its scope
    b. Site problems that can be addressed by early actions
    c. Types of actions (e.g., emergency, non-time-critical, early) that will be used
    d. Site problems deferred to final action

4. Diagram or table showing the use of early and final actions in the phased response

5. Strategic objectives and overall approach for each selected action

6. Summary understanding of extended project team about how the phased response strategy will be implemented

    Discussion of advantages of the phased response strategy
    b. Major issues and their resolution (or interim assumed resolution) to facilitate the phased response, for example

        1. Waste disposal
        2. Land use
        3. Exposure scenario
        4. ARARs
        5. Corrective Action Management Unit (CAMU)

7. Schedule

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Note F. **Example Phased Response Strategy: Weldon Spring Site Remedial Action Project.**

This example of a phased response strategy is from the Weldon Spring site in Missouri. It is taken from the FS for the main operations area, known as the Chemical Plant Area. The strategy being implemented at the site relies on extensive use of early actions to achieve risk reductions years before final RODS will be possible. Because most of the early actions had been or were being implemented when this was written (in late 1992), much of the strategy is retrospective in nature. Typically, a phased response strategy would be prospective. Nevertheless, this is an excellent example of using all of the CERCLA tools to clean up a site more quickly and efficiently than is possible when every problem proceeds through a comprehensive RI/FS.

1.5 Scope of Site Environmental Activities and Documentation

Cleanup of the Weldon Spring site consists of several integrated components, which are shown together with the affected media in Figure 1.7. An overview of the relationship between environmental compliance activities and documents for the project is presented in Figure 1.8. This FS is one of the primary evaluation documents of the RI/FS-EIS for the current remedial action at the chemical plant area. The scope of this action encompasses all media except groundwater and includes vicinity properties related to the chemical plant area except the Southeast Drainage. Additional documents will be prepared within the next several years to support decisions for both groundwater and the Southeast Drainage.

Scope of specific action and role in overall phased strategy.

The RI/FS-EIS also addresses comprehensive disposal decisions for the project, including the disposition of contaminated material generated as a result of previous response actions and material that might be generated by upcoming response actions. The scope of this FS in relation to the chemical plant area component of site remediation is discussed in Section 1.5.2.

Discussion of actions taken and planned that constitute the phased approach strategy.

A number of interim actions have already been documented to address other components of the site remediation process, including the first and second stage of quarry cleanup (i.e., the surface water and bulk waste components). These actions and related documents are described in Section 1.5.1. Additional documents will be prepared within the next several years to address the remaining quarry components (i.e., residual solid material; vicinity soil, sediment, and surface water; and groundwater). Those actions and related documents are discussed in Section 1.5.3.

All interim actions for the project, both expedited response (removal) actions and interim remedial actions, have been performed in accordance with CERCLA requirements and within the constraints of CEQ regulations for NEPA for interim actions while an EIS is in preparation (Title 40, Code of Federal Regulations, Part 1506.1 [40 CFR 1506. l]). That is, the interim actions have been justified independently, have been accompanied by adequate environmental documentation, and have not prejudiced the ultimate decision for which the RI/FS-EIS is being prepared (e.g., by limiting the choice of reasonable alternatives). The interim actions have not addressed decisions on remediating the entire chemical plant area or comprehensive waste disposal. Contaminated material generated by the interim actions is being placed in short-term storage at the chemical plant area, pending the final waste disposal decision for the project. This decision will be based on the information and analyses presented in the RI/FS-EIS.

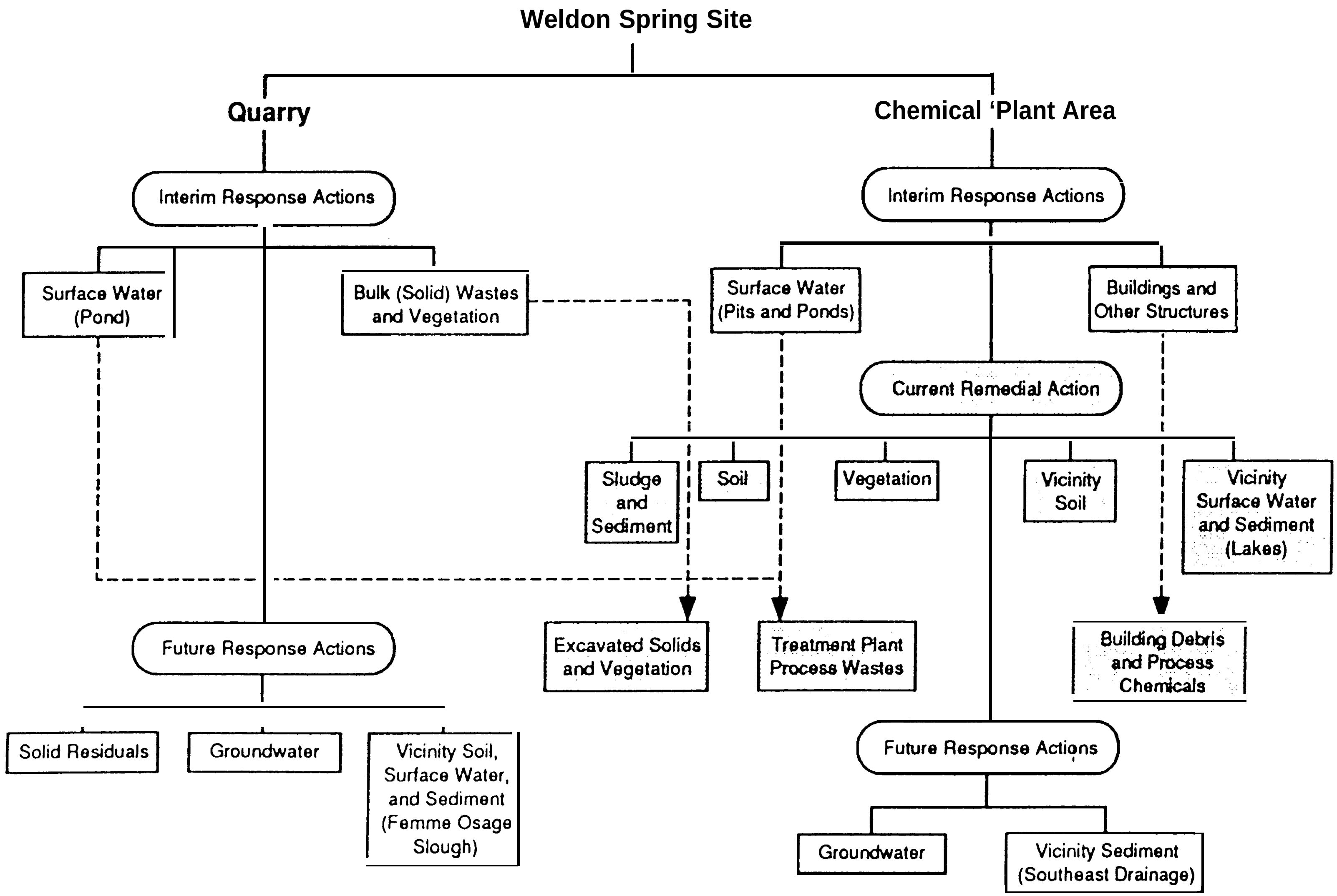
Regulatory basis and authority for action.

Integration and scope of removal actions, early remedial actions, and final remedial actions.

1.5.1 Previous Response Actions

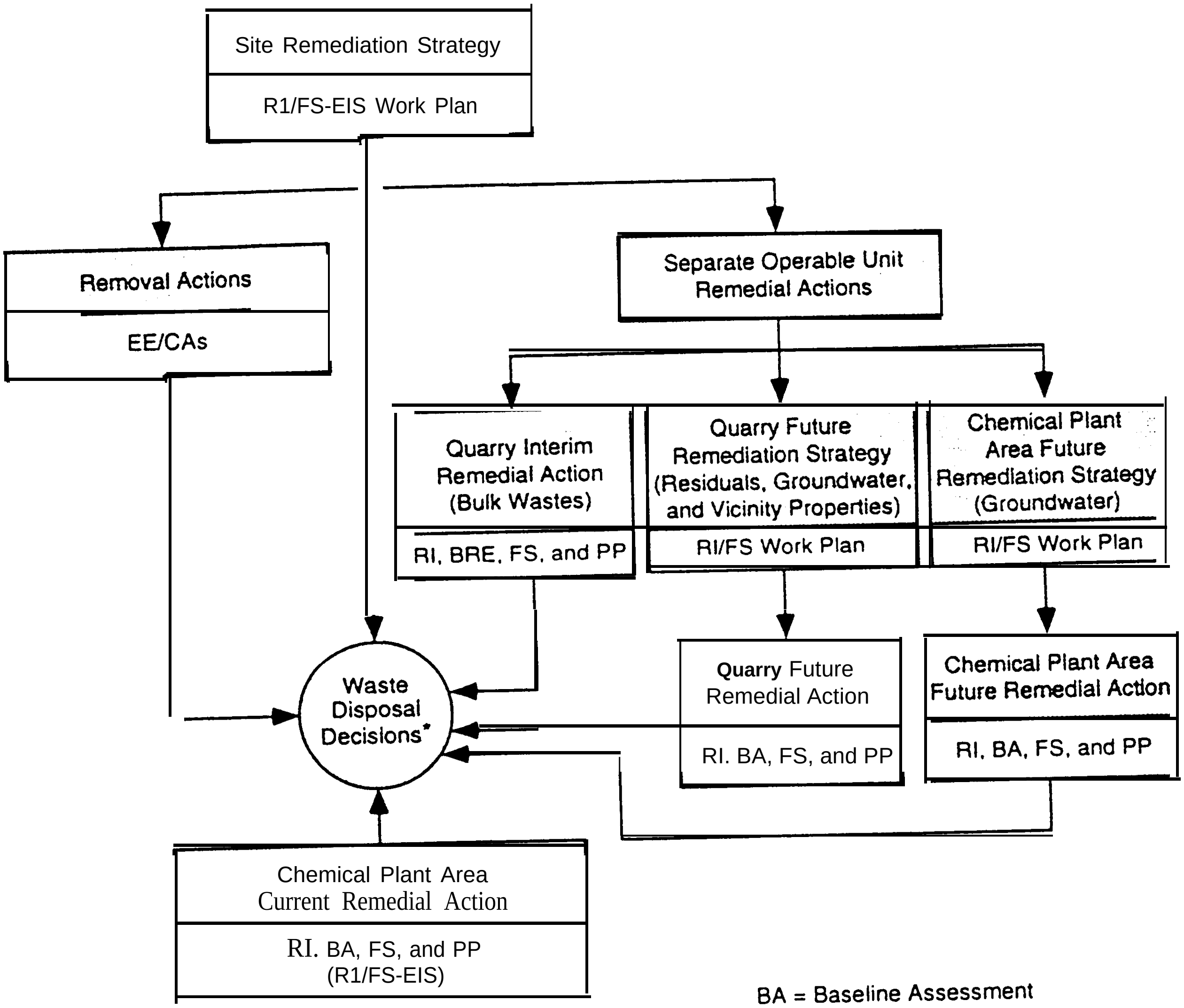
Various interim actions have been identified for the project to mitigate actual or potential releases of radioactive or chemical contaminants into the environment. A number of small-scope expedited response actions

Previous interim actions.



Note: The boxes represent contaminated media *addressed by the project's cleanup actions for the chemical plant area and the quarry, and they are connected by solid lines to the appropriate phase of site cleanup. Dashed lines identify waste stored at the chemical plant area as a result of the interim actions. The media for which specific treatment and dlsposal) decisions will be made as part of the current remedial action are indicated led by shading.*

FIGURE 1.7 Components of Site Remediation (Note that the disposition of contaminated material from future response actions is addressed in the current remedial action.)



BA = Baseline Assessment
BRE = Baseline Risk Evaluation
EE/CA = Engineering Evaluation/Cost Analysis
EIS = Environmental Impact Statement
FS = Feasibility Study
PP = Proposed Plan
RI = Remedial investigation

Disposal decisions for all site material will be detemined from the evaluations in the **R1/FS-EIS for the current remedial action.*

FIGURE **1.8** Major Environmental Compliance Activities and Related Documents for the Weldon Spring Site Remedial Action Project have been documented in focused engineering evaluation/cost analysis (EE/CA) reports. As discussed below, some of these CERCLA reports have been supplemented to incorporate NEPA values and to serve as environmental assessment (EA) reports under NEPA; in other cases, a memorandum-to-file was appropriate as the NEPA review for the proposed action (this was a level of NEPA review that was discontinued by DOE on September 30, 1990).

1.5.1.1 Expedited Actions at the Chemical Plant Area

Expedited actions at the chemical plant area were defined to mitigate health and safety threats to on-site persomel and/or to respond to off-site contaminant releases. Pursuant to the integrated EE/CA process, which included a public review and comment period, the following actions have been implemented:

Previous removal actions and list of site problems addressed as non-time-critical removal actions.

- Inactive power lines and poles that were falling to the ground have been taken down. Uncontaminated material has been released off-site for reuse, and contaminated material has been placed in the debris staging area of the MSA.

- Overhead external piping insulated with deteriorating asbestos coverings has been taken down. The asbestos coverings have been removed, and all material has been surveyed and classified. Most of the piping has been released off-site for reuse; the remainder has been placed in the debris staging area of the MSA. The asbestos has been bagged and placed in bin containers for short-term storage in the northeastern portion of the site (Figure 1.3).

- Polychlorinated biphenyls (PCBs) have been flushed from electrical equipment. Items contaminated with PCBs only have been transported off-site to a permitted treatment and disposal facility; PCB-contaminated items that are also radioactively contaminated are stored on-site within an empty nonprocess building that was recently converted for waste storage (Building 434).

- Chemicals from various buildings have been (and continue to be) containerized and consolidated in Building 434.

- A small amount of radioactively contaminated soil from a vicinity property on the adjacent Army Reserve area has been excavated, drummed, and placed in controlled storage in Building 434.

- A dike and diversion system has been constructed at Ash Pond to direct surface runoff around a contaminated area (the South Dump) in order to reduce contaminant releases (principally uranium) off-site via surface drainage from the northern site boundary.

- Several nonprocess buildings have been dismantled (including the former administration building and steam plant), and the resultant contaminated material has been placed in the debris staging area of the MSA.

More extensive interim actions have also been documented for the project (Figure 1.7), but these actions are in the detailed design and site preparation stage and have not yet been fully implemented. Two such actions, management of contaminated pond water and management of the bulk (solid) waste, address quarry components of site remediation (see Sections 1.5.1.2 and 1.5.1.3).

1.5.1.2 Management of Quarry Pond Water

Site problem addressed as non-time-critical removal action.

Management of contaminated surface water in the quarry was proposed as an expedited response action to mitigate the potential threat to a nearby drinking water supply, i.e., the county well field located within 1.6 km (1 mi) of the quarry (Figure 1.2). Monitoring results have indicated that contaminants are migrating from the quarry pond into the local groundwater and moving in the direction of the well field. The quarry pond is contaminated as a result of contact with the solid wastes that were placed in the quarry more than 20 years ago. This pond provides a gradient for contaminant migration because the pond surface is higher than the nearby groundwater table. An EE/CA, written to incorporate NEPA values appropriate for an EA, was prepared to support this action (MacDonnell et al. 1989).

The alternative selected pursuant to the integrated EE/CA process, which included public review and comment, was to treat the pond water in a facility constructed adjacent to the quarry and release the treated water to the Missouri River in compliance with a permit issued to DOE by the Missouri Department of Natural Resources. A responsiveness summary was prepared to respond to public comments on the EE/CA, and the documents were adopted as an EA under NEPA. A finding of no significant impact (FONSI) was issued in February 1990. The water treatment plant has recently become operational and is expected to treat water during the quarry remedial action period, e.g., for 8 to 10 years. The treatment plant process waste will be containerized for transport to the TSA, as described for the quarry bulk waste. In addition to mitigating a potential threat to human health and the environment at the quarry, this action supports the second component of quarry cleanup, i.e., management of the bulk waste.

1.5.1.3 Management of Quarry Bulk Waste

Site problem addressed as early removal action. Technical basis for action.

Management of the bulk (solid) waste was proposed as an interim remedial action to mitigate the potential threat associated with that waste, which is the source of contaminants migrating into the air and the underlying groundwater at the quarry. A focused RI/FS package was prepared to support the action and was written to incorporate NEPA values appropriate for an EA. This document package consisted of (1) an RI, which presented characterization information for the quarry and the waste therein (DOE 1989); (2) a baseline risk evaluation, which assessed potential exposures to this waste in the short term under current conditions (DOE 1990a); (3) an FS, which developed, screened, and evaluated potential alternatives for managing the bulk waste (DOE 1990b); and (4) a PP, which summarized key information from the other primary documents (DOE 1990c).

The alternative selected pursuant to the integrated RI/FS process, which included public review and comment, was to excavate the bulk waste from the quarry and transport it to the chemical plant area of the Weldon Spring site for short-term storage, pending the disposal decision that will be determined from the current RI/FS-EIS. Removal of the quarry pond water will facilitate the excavation of this waste. Following excavation, the waste is to be placed in controlled storage in an engineered facility (termed the TSA) constructed adjacent to the raffinate pits. The TSA includes an equipment decontamination pad and contains a retention pond to collect water such as precipitation runoff and any leachate generated during the projected 3- to 6-year storage period. Also included in this action was the decontamination and dismantlement of four buildings in the area targeted for the TSA and the construction of an MSA debris staging area for short-term storage of this material (and other debris from similar actions [Section 1.5.1. l]), pending the upcoming disposal decision.

A responsiveness summary was prepared to respond to public comments on the quarry RI/FS, and a ROD prepared in accordance with the CERCLA decision process was signed by EPA in September 1990 and issued by DOE in March 1991. (The NEPA review process for this action was addressed together with a related response action for surface water at the chemical plant area, as discussed in Section 1.5.1 .4.) Waste excavation is expected to be initiated in 1993 and to continue for 2 to 3 years.

1.5.1.4 Management of Water Impounded at the Chemical Plant Area

Technical basis for action.

An additional expedited response action for the project, management of contaminated water impounded at the chemical plant area, was proposed to mitigate the potential threat associated with ecological exposures and contaminant releases to on-site groundwater and off-site surface water. An EE/CA, written to incorporate NEPA values appropriate for an EA, was prepared to support this action (McDonnell et al. 1990). The alternative selected pursuant to the integrated EE/CA process, which included public review and comment, was to treat the impounded water in a facility constructed adjacent to the raffinate pits and release the treated water to the Missouri River in compliance with a permit issued to DOE by the Missouri Department of Natural Resources. The treatment plant process waste will be containerized and placed in short-term storage at the TSA, pending the upcoming disposal decision. Also included in this action was the decontamination and dismantlement of three structures in the area targeted for treatment plant construction, with short-term storage of debris in the staging area at the MSA. This water treatment action supports the quarry bulk waste action because the plant would be available to treat water collected in the TSA retention pond.

A responsiveness summary was prepared to respond to public comments on the EE/CA, and a removal action decision document was prepared to support the CERCLA decision process. The integrated RI/FS for the bulk waste interim action and the EE/CA for this water treatment plant were jointly adopted as an EA under NEPA, and a FONSI was issued in November 1990.

The original discharge plan for the water treatment plant, which was to release the effluent to the Southeast Drainage for gravity flow to the Missouri River, was subsequently modified during detailed design of the treatment system. As part of the design effort, flows in the drainage were studied to assess the potential for contaminant resuspension at the expected discharge rates. Clean water was released from a hydrant at the upper end of the channel and then sampled for uranium at several locations downstream. Results indicated that uranium in the sediment from past releases (e.g., from decanting the raffinate pit water) could be resuspended at levels comparable to those naturally occurring in the Southeast Drainage after rainfall or snowmelt. To limit the potential for this resuspension, the design was changed such that treated water would be released through a buried 15-cm (6-in.) pipe similar to that designed for the quarry water treatment plant. The route determined for this pipeline follows the haul road recently constructed for transporting the bulk waste from the quarry to the chemical plant area, then parallels an abandoned railroad embankment and turns to follow a dirt road toward the Missouri River, with discharge through a submerged outfall.

A separate NEPA review (categorical exclusion) was conducted to address this design modification, and a floodplain/wetlands assessment was published in the *Federal Register* on September 15, 1992. The treatment plant and pipeline are expected to be completed soon and the facility is expected to be operational in early 1993. It would continue to treat water at the chemical plant area during the remedial action period, e.g., for 8 to 10 years.

1.5.1.5 Management of Chemical Plant Structures

A further interim action for the chemical plant area, management of 15 nonprocess buildings, was documented as an expedited response action to mitigate potential health and safety threats to on-site personnel. This action

Technical basis for non-time-critical removal action.

also addressed the potential threats associated with contaminant releases off-site. The chemical plant buildings have been inactive for more than 20 years and are in varying stages of disrepair; the roofs of some of these buildings have deteriorated to the extent that rainfall enters during storms, resulting in potential contaminant resuspension and transport off-site via water that enters the old process sewers.

An EE/CA and addendum, written to incorporate NEPA values appropriate for an EA, were prepared to support this action (McDonnell and Peterson 1989, 1990). The alternative selected pursuant to the EE/CA process, which included public review (no formal comments were received), was to decontaminate and dismantle the buildings and place the material in controlled storage within the MSA, pending the upcoming disposal decision; uncontaminated salvageable material such as structural steel could be released off-site for reuse.

A similar interim action to decontaminate and dismantle the remaining chemical plant structures was subsequently documented as an expedited response action, to mitigate similar threats. An EE/CA, written to incorporate NEPA values appropriate for an EA, was also prepared to support this action (Peterson and McDonnell 1991). The alternative selected pursuant to the EE/CA process, which included public review (no formal comments were received), was the same as that selected for the 15 nonprocess buildings. A removal action decision document was prepared for the CERCLA decision process. The two EE/CAs and the addendum were jointly adopted as an EA under NEPA, and a FONSI was issued in October 1991.

1.5.2 Currently **Proposed Response Action**

Scope of final action.

Two basic components of the chemical plant area are addressed in this FS:

- Assessment of the appropriate response for contaminated soil, sludge, sediment, and vegetation; and

- Assessment of the appropriate response for vicinity properties associated with the chemical plant area, except the Southeast Drainage; these vicinity properties include localized areas of contaminated soil and water, sediment, and shoreline soil at lakes in the Busch Wildlife Area.

This RI/FS-EIS also addresses the disposition of material resulting from previous interim actions (Section 1.5. 1), including:

- Bulk waste excavated from the quarry and stored at the TSA;

• Demolition debris, equipment, tanks, and other material resulting from the decontamination and dismantlement of site structures (referred to as structural material in this FS) and stored at the MSA debris staging area; • Chemicals stored in Building 434; • Asbestos removed from piping and structures and stored in the staging area in the northern portion of the site; and • Containerized process wastes generated by water treatment plants at both the quarry and the chemical plant area and stored at the TSA. Future leanup decisions for the quarry are not included in the scope of the current remedial action for the chemical plant area; these will be addressed in documentation to be prepared within the next several years, as will the decisions for the Southeast Drainage and groundwater (see Figures 1.7 and 1.8 and Section 1.5 .3). However, contaminated material that could be generated as a result of future activities is expected to be similar to that addressed by the current action. Hence, the disposition of that material is included in this RI/FS/EIS process for planning purposes to ensure a comprehensive disposal decision for the project. The BA (DOE 1992a) addresses conditions as they existed at the site in early 1992, irrespective of interim responses for which decisions had already been made but had not yet been fully implemented. In contrast, the updated conditions for this FS reflect the configuration of the site as it will soon exist as the result of those interim actions. That is, although the bulk waste is still in the quarry, this waste was assumed to be in storage at the TSA for the analyses in this document. In addition, although many buildings and underground tanks are still in place at the chemical plant area, contaminated material resulting from their decontamination and dismantlement was assumed to be in storage at the debris staging area of the MSA. Finally, although surface water is still present in the quarry pond and in the pits and ponds at the chemical plant area, it was assumed that the water treatment plants are operating at both locations. The locations of the TSA and MSA, including the debris staging area, are shown in Figure 1.3. The volume of material at the TSA is expected to total about 115,000 m^3 (150,000 yd^3), and the volume of material at the debris staging area is estimated to total about 73,000 m^3 (95,000 yd^3); the latter will consist of contaminated material generated from building dismantlement. In addition, up to 168,000 m^3 (220,000 yd^3) of contaminated soil and rubble generated by cleanup and support activities (e.g., for construction of the water treatment plant and TSA) would be staged in the MSA soil staging area, as needed, over the remedial action period. The materials assumed to be stored at the TSA and MSA are summarized in Table 1.1 and are also described in the RI report for the quarry bulk waste	**Expected conditions.**

(DOE 1989) and the design criteria report for the MSA (MK-Ferguson Company and Jacobs Engineering Group 1990).

The locations of the water treatment plants are shown in Figures 1.2 and 1.3. me annual average volume of process wastes generated by water treatment is not expected to exceed about 30 m^3 (50 yd^3) for the quarry system and about 70 m^3 (90 yd^3) and 290 m^3 (380 yd^3) for the physicochermical and distillation process trains, respectively, of the chemical plant area system. The types of process wastes that would be generated are described in the respective EE/CA reports (McDonnell et al. 1989, 1990). Volume estimates for the contaminated media at the site are summarized in Section 2.1.

1.5.3 Future Response Actions

Relationship of this action to future actions.

Additional response actions are proposed for the project to address the last two components of the chemical plant area remediation – the Southeast Drainage and groundwater. Further actions are also proposed to address the final stage of quarry remediation, i.e., to manage residual material at the quarry area following bulk waste removal.

The response for the Southeast Drainage has been separated from the current response action in part because conditions in the drainage will change as a result of the upcoming decision for the chemical plant area. For example, water quality will improve because cleanup activities on-site are expected to reduce contaminant transport in surface runoff down the drainage, which would also limit potential deposition of suspended solids. Also, further sampling is needed to fully characterize the drainage so more representative impacts can be assessed. Therefore, the Southeast Drainage will be addressed as a removal action within the next several years, and an EE/CA will be prepared to support related decisions.

The groundwater response action has been separated from the current response action because the comprehensive data needed to support a final decision are not currently available. This approach will also permit coordination with the Army, which is responsible for the adjacent NPL site at which groundwater is also contaminated (Section 1.3.1). Therefore, groundwater remediation is being addressed as a separate operable unit remedial action. Over the next several years, an RI/FS work plan will be prepared to describe the scope of this action, and an RI, BA, FS, and PP will be prepared to support related decisions.

List of site problems to be addrssed in future actions.

me scope of the follow-on actions for the quarry will also be defined in an RI/FS work plan that will be prepared within the next year to support the final decision-making process for this area (Figure 1.8). This follow-on effort will assess the appropriate response for (1) residual solid materials in the cracks and crevices of the quarry, (2) groundwater at the quarry, and (3) contaminated media at quarry vicinity properties, which include surface water and sediment in Femme Osage Slough and nearby areas of contaminated soil. After the bulk waste has been excavated from the quarry, the quarry walls, floor, and subsurface will be characterized. Additional data will be evaluated in a BA for the final quarry response. Alternatives for the permanent disposition of the quarry area will be developed and evaluated in an FS, and a PP will be prepared to propose the final response.

As for the other documents, these future documents will incorporate NEPA values whenever practicable, and they will be issued to the public for comment. The types and volumes of contaminated material that could be generated as a result of upcoming activities have been conservatively estimated in this FS for planning purposes to support comprehensive project decisions. These volumes and those estimated for other contaminated media are presented in Section 2.1.

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Submodule 1.2 Development of a Consensus Memorandum

Phased Response Strategy

1.1 Development of a Phased Response Strategy

Development of a Consensus Memorandum

1.2 Development of a Consensus Memorandum

- **Developing Consensus of Extended Pro]ect Team**
- **Documenting the Consensus**

Submodule 1.2 Development of a Consensus Memorandum

Background

A consensus memorandum documents the need for and intent to undertake a specific early action for a particular site problem and initiates the decision and design support phase.

A consensus memorandum should contain the following elements:

- A brief summary (less than 1 page) of the phased response strategy for the specific OU, the OU background, and problems that exist
- A listing of objectives for the early action
- A paragraph on the specific site problem being addressed by the consensus memorandum, the type of early action, and authority
- A statement of consistency with the final remedy
- A statement of consensus from the extended project team
- A summary of the technical basis and overall approach
- A summary of major issues and assumptions
- A list and schedule of specific actions to complete design and decision support phase and, if appropriate, the early action

One consensus memorandum should be prepared, just prior to initiation, for each early action identified in the phased response strategy. It is short (less than 10 pages) and specific.

Organization

Submodule 1.2 discusses the following:

- Developing consensus of extended project team
- Documenting the consensus

In addition, more detailed information is provided in the following notes:

- Note A-Example Consensus Memorandum Outline
- Note B-Example Consensus Memorandum: Hanford 1OO-BC-1 Demonstration Project Agreement

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Sources

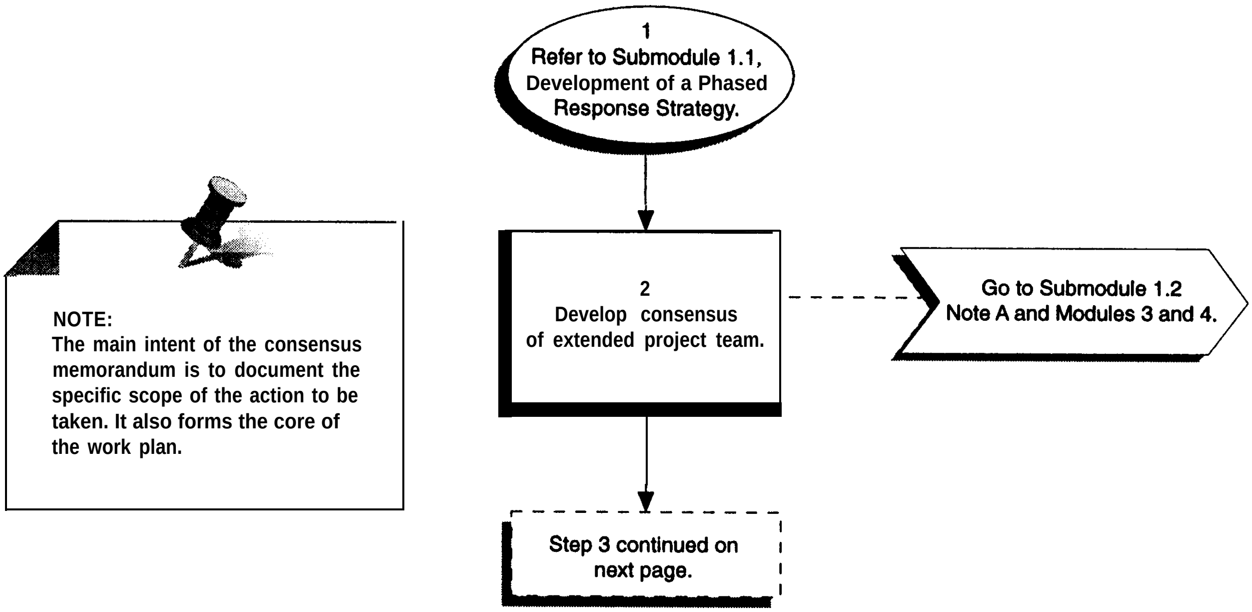
1. DOE, September 1994, CERCM *Removal Actions, DOE/EH-0435.*

2. U.S. EPA. *Guidance for Evaluating Technical Impracticability of Ground Water Remediation.* OSWER Directive 9234.2-24.

3. U.S. EPA. *Considerations in Ground-Water Remediation at Supsend Sites and RCRA Facilities.* OSWER Directive 9283.1-06.

4. 40 CFR300, March8, *1990, National Oil and Hazardous Substances Pollution Contingent Plan,* Federal Register, Vol. 55, No. 46 Rules and Regulations.

Submodule 1.2 Development of a Consensus Memorandum



Step 1. Refer to Submodule 1.1, Development of a Phased Response Strategy.

Step 2. **Develop consensus of extended project team.** To initiate an early action, the extended project team must reach consensus on three points:

- Agreement that action is required to address some release or threat of a release and agreement on the general nature of the action that will be required
- The technical basis for deciding that action will be necessary (including risk)
- Agreement on how to manage the technical/regulatory issues that will guide or constrain the action

These points must be addressed in the consensus memorandum.

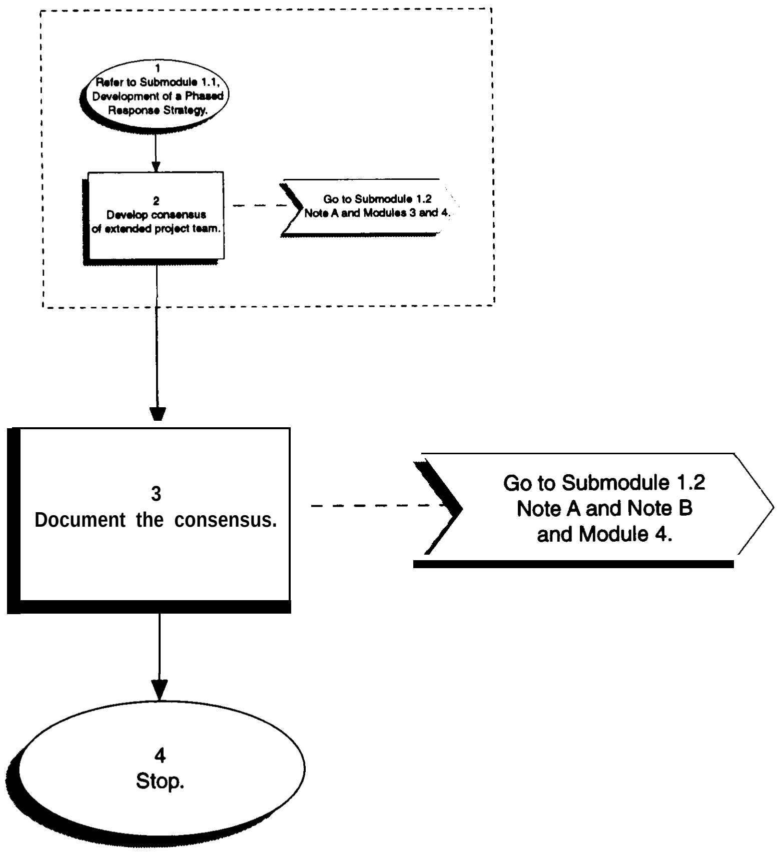
In the phased response strategy, (see Submodule 1.1) working assumptions were developed for all significant regulatory and other issues that can hinder or prevent early action. In the consensus memorandum, those same issues must be resolved in more detail. In this instance, the resolutions are not mere working assumptions, but represent resolution of the issues *for the purposes of the early action.* Final consensus must be reached on at least the following:

- Interims cleanup levels
- ARARs and waivers
- Use of innovative technologies
- Treatment, storage, and/or disposal of investigation-derived waste (IDW) and remediation waste
- Land use
- Use of institutional controls

The NCP requires early actions to be consistent with the final remedial actions. Therefore, a consensus memorandum should identify the following:

- Whether the early action will interfere with any future, full-scale remedial actions
- Where potential interferences might occur, the risks and how they can be avoided or mitigated
- The follow-up actions needed as part of the comprehensive RI/FS/RD/RA to prepare a final ROD
- Use of imovative technologies
- Disposition of remediation waste

Submodule 1.2 Development of a Consensus Memorandum (cont.)



- Land use
- Use of institutional controls

Submodule 1.2, Note A provides additional detail about the differences between the strategy memorandum and the consensus memorandum. Modules 3 and 4 provide additional detail on how these concepts are addressed during implementation.

Step 3. **Document the consensus.** A consensus memorandum should reflect the agreement of the extended project team to initiate the early action (i.e., the decision and design support phase). The consensus memorandum may serve the purpose of the work plan for a relatively simple site problem or form the core of a more detailed work plan for a more complex site problem. (See Module 4, Non-Time-Critical Removal Actions and Early Remedial Actions.) The main focus of the consensus memorandum is to present the scope of the action to be undertaken. Submodule 1.2, Note A provides an example outline for a consensus memorandum; Note B provides an example consensus memorandum.

A consensus memorandum should reflect the agreement of the extended project team to initiate the early action. The consensus memorandum may serve the purpose of a work plan for a relatively simple site problem or form the core of a much more detailed work plan for a complex site problem (see Module 4, Non-Time-Critical Removal Actions and Early Remedial Actions).

An early action must contribute to the overall objectives of the comprehensive RI/FS. The NCP requires early actions to be consistent with the final remedial action. Therefore, a consensus memorandum should identify the following:

- Whether the early action will interfere with any future, full-scale remedial actions
- Where potential interferences might occur, the technical risks involved in undertaking the action, and how they can be avoided or mitigated
- The follow-up actions needed as part of the comprehensive RI/FS to prepare a final ROD.

Step4. Stop.

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Note A. __Example Consensus Memorandum Outline__.

I. Summary of OU phased response strategy, OU background, and specific problems addressed by the early action

II. Early action(s) identified and authority

III. Objectives of the early action(s) (more specific than they appeared in the phased response strategy)

IV. Statement of consistency with the final remedy

V. Statement of consensus from the extended project team

VI. Summary description of the technical basis and overall approach envisioned for the early action

1. Scope of action(s)
2. General response actions and technologies
3. Sequencing and schedule of action(s)
4, Disposition of waste(s) (treatment, storage, and disposal)
5. Operation and maintenance
6. Measures of success/completion
7, Closeout

VII. Major issues and assumptions

1. Rationale for action(s) (including risk)
2. Interim cleanup levels
3. ARARs and waivers
4. Use of innovative technologies
5. Management of waste(s)
6. Interim land use assumption for this action(s)
7. Use of institutional controls
8. Consistency of proposed early action with likely final ROD
9. Division of responsibilities (among extended project team)

VIII. List and schedule of specific actions necessary to complete early action

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Note B. **Example Consensus Memorandum: Hanford 1OO-BC-1 Demonstration Proiect Agreement.**

The following example consensus memorandum is for a removal action performed at Hanford as a precursor to an early remedial action and eventually a final action. As such it is an agreement to take action on a limited number of waste sites as part of a series of phased responses (i.e., removal, early remedial, final).

This example was not called a "consensus memorandum" during its development by DOE, EPA, and Washington State Department of Ecology; nor does it exactly follow the outline for a consensus memorandum (Submodule 1.2, Note A). However, this example illustrates how the intent of a consensus memorandum can be met in other formats. This agreement:

- Defined the scope of the action
- Described its interaction with the next phased response
- Provided strategic objectives of the three agencies
- Described the regulatory process that would be used to achieve the objectives
- Documented the agencies' consensus to take action
- Formed the core of the Removal Action Work Plan

The agreement was developed by the agencies, with DOE's contractor providing technical support over a series of four meetings of approximately 4 hours each.

1OO-BC-1 Demonstration Project	
1.2 Background	
The Proposed Plan for the 1OO-BC OU is expected to be issued by June, 1995 with a record of decision to be signed by October, 1995. Continuous and substantive remedial activities are required within a 15 month period following the Record of Decision (ROD). Further, the Tri-Parties wish to initiate full-scale (i.e., concurrent remedial activities at multiple waste sites) within this 15 month time frame. A demonstration project is being conducted to 1) implement the preferred alternative defined in the proposed plan, and 2) reduce uncertainty prior to full scale remedial design and remedial action (RD/RA).	**Reasoning for a removal action being conducted as the first phase of a series of responses.**
Scope	
The 1OO-BC-1 Demonstration Project will implement the preferred alternative presented in the draft proposed plans on a limited basis (i.e., remove and dispose without treatment) and generate information to reduce Remedial Design and Remedial Action (RD/RA) uncertainties. The Demonstration Project will focus on a limited number of waste sites (e.g., 3 or 4). The waste sites will be addressed sequentially.	**Difference between the removal action and early remedial action.**
Treatment will not be included in the demonstration project, although the criteria to be used in determining when treatment is appropriate for both volume reduction and to meet LDRs may be developed. If LDR material is encountered, the ability to identify, and segregate soil contaminated with LDR substances (e.g.; mercury) will be evaluated as part of the demonstration project. Contaminated soil removed during the demonstration project may be stored (on or off site) until disposal can be arranged at a reasonable cost. Disposal of any contaminated soil stored during the demonstration project will be part of full scale remedial action,	**Waste management issues addressed.**
Approach	
The 1OO-BC-1 Demonstration Project will be conducted under CERCLA Section 104 authority as an non-time critical removal action. This removal action will be conducted concurrently and in cooperation with the 100 Area Remedial Action design process. The primary objective of the Demonstration Project will be remediation of 3 to 4 waste sites. Uncertainties that exist for full scale remedial design and remedial action (RD/RA) will be reduced through the collection of data during these activities.	**Regulatory authority.** **Tie to other responses.**
An Engineering Evaluation and Cost Analysis (EE/CA) will be prepared and issued for public comment. After public comment an Action Memorandum will be issued as required by CERCLA	**Regulatory process.**

section 104. The EE/CA will incorporate the objectives and data needs developed by the extended project team and presented in this document. The 1OO-BC-1 Demonstration Project, and the 1OO-BC- 1 Remedial Design Plan are included in the scope of the Hanford SAFER Pilot Project, one of four SAFER pilot projects being conducted jointly by DOE and EPA at DOE facilities. The tenets of SAFER will be applied during the demonstration project and the remedial design. The scope, objectives, and data requirements for the Demonstration Project were developed through regulator participation in building extended project team consensus through the SAFER Pilot Project. The SAFER Tenets of managing uncertainty through the observational approach and developing data needs and decision rules through the Data Quality Objectives (DQO) process will be used during planning, design and implementation of the removal action. RD/RA Uncertainties	
The 1OO-BC-1 Demonstration Project is an implementation of the RD/RA system on a limited scale to achieve remediation. The Demonstration Project will also be used to reduce uncertainties in critical areas, and allow improvement during design and implementation of the full scale remedial action system. The extended project team developed a conceptual model of RD/RA and identified specific uncertainties for RD/RA. Data needs to reduce these uncertainties during the Demonstration Project were developed. It is generally recognized by the extended project team that the preferred alternative (i.e., remove, treat as appropriate, dispose) is robust. There is little uncertainty that contaminated soil can be excavated, treated to meet LDR requirements when required, and disposed. There is uncertainty in how the preferred alternative can be implemented most efficiently in terms of time, cost, and worker health and safety.	Explanation of why and how uncertainties are being addressed in overall project.
Specific uncertainties identified by the extended project team, include:	Consensus.
• Cultural Resources –Although general cultural and natural resources procedures are well-developed and understood, specific tasks and mitigation options remain for development with the Native American Tribes and the Hanford Trustees.	List of uncertainties to be addressed-note that they include technical (e.g., design issues) as well as regulatory (remediation standards) and procedural (e.g., acquisition strategy).

• **Numerical Remediation Standards** –Remediation standards will be derived from remediation goals in the ROD and will be the specific contaminant levels that must be met at an individual waste-site. The current drafts of the proposed plans require the use of balancing considerations to determine how deep to dig for protection of groundwater beyond the levels required to protect human health at the surface. The balancing considerations include cultural resource impacts, natural resource impacts, cost, foot print of the ERDF, and other considerations. The applicability of the balancing criteria, and protocol for using them have not been established.
 	
• Design – Protocol for coordination of remedial design with cultural and natural resource assessments and mitigation needs to be established. Contingency plans to address site specific uncertainties (including cultural resources) are also required. The integration of the various components of remedial action to achieve efficiency is required (e.g.; capacity, throughput).
 	
• Design of Remedial Action Subsystems –Subsystems include:
 	
  • Waste Management – Packaging and treatment requirements to meet disposal site WAC are undefined. Specific data requirements to meet WAC are undefined.
 	
  • Analytical System –The analytical system will be used to support decisions during remedial action. Decision areas requiring the support of the analytical system include 1) excavation, 2) waste management and disposal, 3) health and Safety, and 4) confirmation sampling. The type and amount of sampling to support these decisions will need to be developed. The analytical system must be integrated with the other components of the remedial action system to assure that sampling and analysis can support decisions without causing expensive delays in remediation. There are uncertainties in how integration of the analytical system will be achieved.
 	
  • Excavation –Excavation can be conducted using standard equipment. Optimization of the excavation system is the uncertainty.
 	
  • Treatment –Treatment will be used during full scale remedial action when appropriate or required	

for volume reduction, or when required to meet LDRs. Criteria and decision rules for determining when treatment is appropriate have not been developed.

- **Material Handling –** Packaging of waste may be required for storage or disposal. Packaging systems could be purchased, or built to specifications. The ability to ship or package waste without delaying excavation will be required. The best way to accomplish this needs to be determined.

- **Acquisition Strategy –** Subcontracting of the various components of remedial action may be desirable. Subcontracting approaches should be evaluated for the various subsystems (e.g.; excavation, analytical, packaging, transportation).

Objectives

Objectives for the 1OO-BC-1 Excavation Demonstration Project were developed through consensus of the extended project team. The objectives of the Demonstration Project are to:

Consensus.

1. Implement the preferred alternative as presented in the draft proposed plans on a limited basis (i.e.; remove and dispose, without treatment at 3 or 4 sites). The following tasks must be completed:

   - Develop remediation standards. This includes use of the balancing criteria as described in the proposed plan, and the development of stopping rules.

   - Achieve remediation standards. This includes implementation of the preferred alternative in a safe and timely manner.

Main objective is to remediate 3 sites.

2. While implementing the preferred alternative, collect information to reduce uncertainties prior to fill-scale remediation. These uncertainties include:

   - Specific tasks and mitigation options for cultural and natural resources.

   - Criteria (e.g., cost and effectiveness) for when treatment to achieve volume reduction is applicable.

Secondary objective is to collect information during action to help with design and planning of next response.

- Protocols for meeting LDR requirements if LDR waste is found.

- Applicability of balancing criteria and stopping rule.

- Ability (e.g.; effectiveness, timeliness etc.) to use the analytic system to identify the clean/dirty boundary, and to guide excavation.

- Ability to use the analytic system to identify when remediation standards have been met and are confirmed.

- Groundwater protection requirements (e.g.; monitoring, additional excavation) once remediation standards for surface exposure have been met.

- Cost estimates for remedial action.

- Opportunities for out-sourcing.

- Ability to identify processes that will lead to cost savings and efficiencies

3) Other uncertainties to be determined through the remedial design task or public comment if they may be addressed through this project as scoped.

Data Requirements

The data requirements were developed through the consensus of the extended project team, and are incorporated in table (1). The amount of data collected will be further determined in the test plan, and will ultimately be at the discretion of the Field Manager during operations.

Who will specify in greater detail what information is collected and where it will be documented.

Site Selection

The scope of the demonstration project includes remediation of 3 or 4 waste sites. Three primary sites have been selected by the extended project team with regulatory consensus. The three primary sites are the 116-B-4 french drain, the 116-B-5 crib, and a section of the 116-C-1 effluent disposal trench. Complications may be encountered that preclude early action at one or more of these sites (e.g.; interference with an existing paved road at 116-B-5). If it is determined that such complications can not be addressed within the time frame of the Demonstration Project, an equivalent site will be substituted.

If time allows, a non-IRM candidate site (e.g.; sanitary septic system, ash pit) may be addressed as part of the Demonstration Project. Non-IRM sites have not previously been investigated, The regulatory agencies and the extended project team have agreed that remediation of one non-IRM site would be useful to provide characterization and a model for remediation.	

Uncertainty	Objective	Specific Decisions to be Made for RD	Specific Information to be Collected
Applicability (i.e., necessity and cost effectiveness) of treatment for volume reduction at specific sites.	Determine when treatment to achieve volume reduction is applicable at specific waste sites.	What are the criteria for determining when volume reduction is cost effective at a specific waste site?	1. Throughput required for treatment to not restrict excavation (i.e.; excavation rate in yd/hr). 2. Cost of disposal vs. Cost of treatment. Note: cost of treatment will be estimated based on the required throughput, not by implementing treatment.
		What are the criteria for determining when treatment is technically feasible at a specific site?	1. Gradation of soil. 2. Quantity of contaminated soil 3. Contaminant loading by fraction 4. Mineralogy
Can LDR waste be effectively managed during remediation.	Collect information to develop LDR protocols for RD/RA.	Can LDR material (soil) be identified in real-time (i.e.; <2 hours)	1. Analytic turn-around time required to detect LDR levels 2. What analytical methods are required to determine if LDR materials are present (total and leachable).
		Can LDR material be segregated?	1. Lay-down area required 2. Volume of LDR material

Uncertainty	Objective	Specific Decisions to be Made for RD	Specific Information to be Collected
Remediation standards	What is applicability of the balancing criteria	What is the cost required to excavate contaminated soil above remediation standards for surface exposure in order to achieve groundwater protection?	1. Specific contaminant levels to predict decay 2. Estimated remaining contaminated soil volume 3. Assessment of impact to cultural resources, natural resources, and worker safety (i.e., what is the clean volume, depth, and area that are disturbed) 4. Soil parameters to support leach-ability testing and groundwater impact estimation (e.g., modeling) .
		What is the cost of leaving waste in place (e.g., long-term monitoring) to achieve groundwater protection?	No information will be collected to support this. Determination will be made through a cost estimation study. Coordinate with BC-5 to ensure GW information is collected.
System design	Support the design of a cost-effective and efficient system.	What is the efficiency of individual systems (excavation, material handling, packaging, disposal)?	1. Production rates 2. Down-time and causes 3. Reliability 4. Availability 5. Adaptability 6. Cost 7. Rework

Uncertainty	Objective	Specific Decisions to be Made for RD	Specific Information to be Collected
		How can integration of the system components be improved?	Evaluation of information collected above (the amount and type of information that will be collected will be determined through DQOS)
Accuracy of the cost estimates produced for the Focused Feasibility Studies.	Confirm cost estimate assumptions.	What is difference between estimated volume (using MCACES) and actual volume?	1) Assumption (e.g.; bulk density, sampling). 2) Waste sites input parameters.
Analytical Systems	Support development of full scale analytical system.	What is the most cost-effective analytical approach to guide remediation?	1) Production rates 2) Analytic turnaround times 3) Effect of waste site size on the analytical approach. 4) Comparison of analytical turn-around times versus concentration. 5) Boundary of contamination
		What is the most cost-effective approach to confirm remediation standards are achieved?	Data collected in above to be used in determining confirmation protocol.
Out-sourcing Opportunities	Identify systems for potential outsourcing.	Systems to be outsourced	1) costs 2) Specification (rates, hold points, integration with other system, interface requirements)

Module 2
Contingent Removal Action Approaches

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Module 2 Contingent Removal Action Approaches

Background

Many of the site problems at Department of Energy (DOE) facilities are sufficiently unique that each needs to be investigated separately. However, it is also true that some types of site problems at DOE facilities occur many times with only slight variations (e.g., isolated surficial radioactive hot spots). For such recurrent site problems, developing standard approaches can make sense.

The Environmental Protection Agency (EPA) has developed two concepts to address recurrent site problems: presumptive remedies and generic approaches (EPA, 1993). EPA defines a presumptive remedy as a suite of remediation technologies or approaches that are pre-determined to be the likely logical remediation decision for a given site problem. By establishing presumptive remedies, much money can be saved in investigating sites and evaluating alternatives, and remediation can be streamlined. EPA has identified several presumptive remedies on the basis of their selection in Records of Decision (RODS) and implementation at waste sites around the country. An example is use of capping as the presumptive remedy for dealing with municipal landfills **(citation).**

Generic approaches are similar to presumptive remedies, except that generic approaches are established as being appropriate on a local level (e.g., for multiple similar waste sites at a DOE facility) rather than on a national level. Presumptive remedies do not exist for most of the site problems at DOE facilities. For DOE, establishing generic approaches specific to a single facility can be advantageous. Use of generic approaches for early actions can allow DOE to achieve efficiencies within a facility, similar to using presumptive remedies on a national scale. If a site problem can be expected to arise frequently (perhaps six or more times) serious consideration should be given to developing a generic approach. DOE is developing detailed guidance on the general development and implementation of generic approaches.

This module focuses on one application of generic approaches. Specifically, development of contingent removal action approaches.

Contingent removal actions generally require predefine and agreed upon triggering *criteria*, planning and decision *procedures,* and appropriate technical *approaches.* To develop a contingent removal action, each DOE facility should establish these criteria, procedures, and approaches with assistance and consensus of the extended project team. These criteria, procedures, and approaches are *defined* at the facility-wide level, *integrated* into the phased approach planning at the operable-unit (OU) level, and *implemented* at the specific site-problem level.

Similar to the use of presumptive remedies, removal actions streamline remediation by reducing delays in the paperwork and documentation required to initiate action. When a site problem (e.g., newly identified hot spot or newly discovered potential for a significant release in the near-term) meets the pre-established *criteria,* the DOE project manager or designee can implement the agreed upon removal *procedures* with one of the agreed upon technical *approaches* without need for ad hoc approval of the extended project team. This approach is consistent with both the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (see Appendix A) and EPA's guidance on phased response approaches (EPA, 1993).

A contingent removal action strategy at the facility level should begin as an internal DOE effort involving the DOE project manager or designee and the cognizant contractor project managers. The initial DOE contingent removal action strategy should evaluate and summarize the following:

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- Specific site problems that DOE believes are appropriate for removal actions
- Criteria that DOE believes are appropriate for triggering implementation of removal actions
- Procedures that DOE believes are appropriate for removal actions
- Strategies for integrating removal actions into individual OU phased approaches

The initial removal action approach then becomes a matter of consensus through extended project team and stakeholder meetings. This module provides guidance on developing agreements for developing removal actions and for integrating removal actions into individual OU phased response strategies.

Organization

Module 2 discusses the following:

- Determining types of site problems appropriate for contingent removal actions
- Determining implementation criteria for contingent removal actions
- Determining resultant contingent removal action procedures
- Conducting extended project team meetings, revising approach, and gaining consensus
- Documenting consensus on contingent removal action criteria
- Integrating contingent removal action criteria into OU-specific phased response strategy

In addition, more detailed information is provided in the following notes:

- Note A – Example Meeting Agenda for Discussion of a Contingent Removal Action Approach
- Note B – Example Text for Development of Contingent Removal Action Decision Rules
- Note C – Example Outline of Documentation for Contingent Removal Action Consensus

Sources

1. U.S. EPA, *1988, Superfund Removal Procedures: Revision Number Three,* OSWER Publication 9360.0-03B.

2. U.S. EPA, March 1989, *Guidance on Non-NPL Removal Actions Involving Nationally Significant or Precedent-Setting Issues*, OSWER Publication 9360.0-19.

3. U.S. EPA, November 1990, *Exemptions from Statutory Limits on Removal Actions,* OSWER Fact Sheet 9360. O-12FS.

4. U.S. EPA, December 1990, *Superfund Removal Procedures: Action Memorandum Guidance,* OSWER Publication 9360.3-01.

5. U.S. EPA, April 1991, *Hazardous Waste Operations and Emergency Response: Uncontrolled Hazardous Waste Sites and RCRA Corrective Actions,* OSWER Fact Sheet 9285 .2-08FS.

6. U.S. EPA, August 1991, *Supeerfund Removal Procedures: Guidance on the Consideration of ARARs During Removal Actions,* OSWER Publication No. 9360.3-02.

7. U.S. EPA, August 1992, *Superfund Accelerated Cleanup Bulletin, Presumptive Remedies,* Intermittent Bulletin, Volume 1, Number 3, OS-220W, Publication 9203.1-021.

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8. U.S. EPA, September 1993, *Presumptive Remedies: Policy and Procedures,* OSWER Fact Sheet 9355 .O-47FS, EPA 540-F-93-047.

9. U.S. EPA, September 1993, *Presumptive Remedies: Site Characterization and Technology Selection for CERCM Sites with Volatile Organic Compounds in Soils,* Quick Reference Fact Sheet, Directive: 9355 .O-48FS, EPA 540-F-93-48.

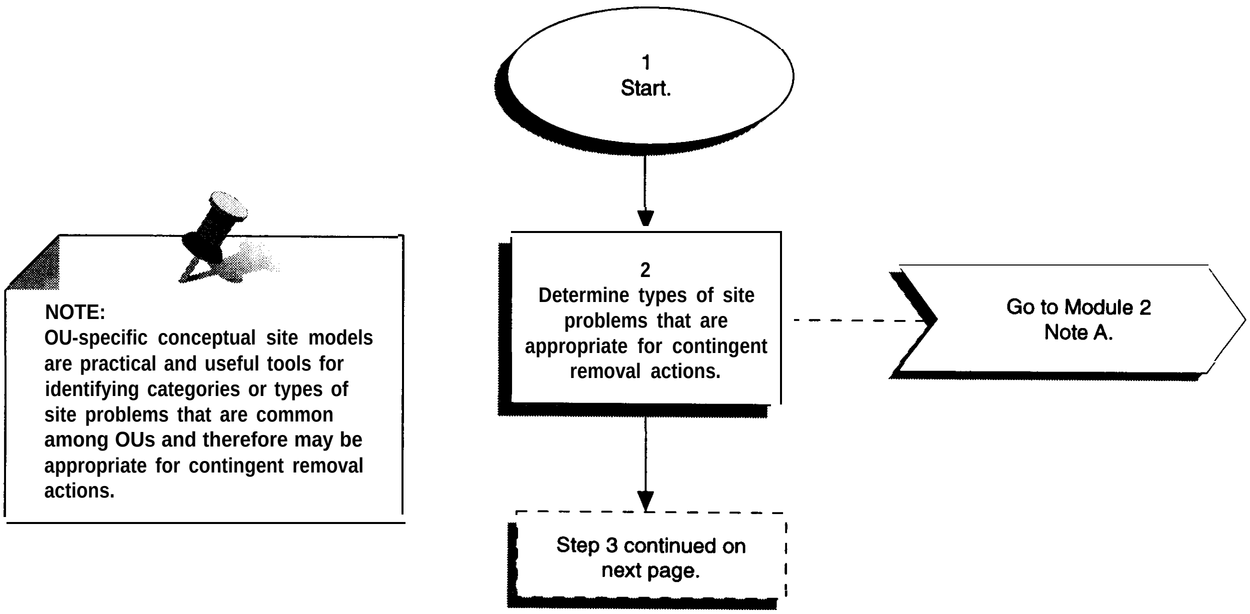
10. U.S. EPA, 1993, *Guidance for Conducting Technical Impracticability, OSWERDirective 9234.2-24.*

11. U.S. EPA, *Considerations in Ground-Water Remediation at Superfund Sites and RCRA Facilities,* OSWER Directive 9283.1-06.

12. DOE, September 1994, *CERCLA Removal Actions, DOE/EH-0435.*

13. 40 CFR 300, March 8, 1990, *National Oil and Hazardous Substances Pollution Contingency Plan,* Federal Register, Vol. 55, No. 46 Rules and Regulations.

Module 2 Contingent Removal Action Approaches



Step 1. Start.

Step 2. **Determine types of site problems that are appropriate for contingent removal actions.** The goal of this step is to identify specific types of site problems for which contingent removal actions could be used. Available information is used for this evaluation. For example, available facility information and any OU-specific conceptual site models developed as part of a comprehensive Remedial Investigation/Feasibility Study (RI/FS). A sitewide team will most often be appropriate for planning contingent removal actions, which can then be incorporated into an OU-specific phased response strategy.

The approach begins with establishing a list of target types of site problems and acceptable approaches (e.g., radioactive soil hot-spot removal). Factors that can support or eliminate certain types of site problems as candidates for contingent removals include: (1) likely frequency of the problem, (2) costs to undertake action to address the problem and to delay action, (3) urgency of the problem, (4) health and safety issues for workers conducting the response, (5) availability of technology to respond or capacity of needed waste management, and (6) benefit realized from taking action (cost savings, time savings, risk reduction).

Using these factors to evaluate the appropriateness of developing a hot-spot contingent removal action might result in the following analysis:

- Hot spots of radiological contaminants (e.g., ^{241}Pu) above 5 pCi/g in the top 6 in. of soil are expected to be encountered frequently.

- The costs to undertake a typical hot spot removal are approximately \$1,500 per yd^3 (including in-field sampling, excavation, packaging, and waste management costs). These finds are available from an existing activity data sheet (ADS) and work package.

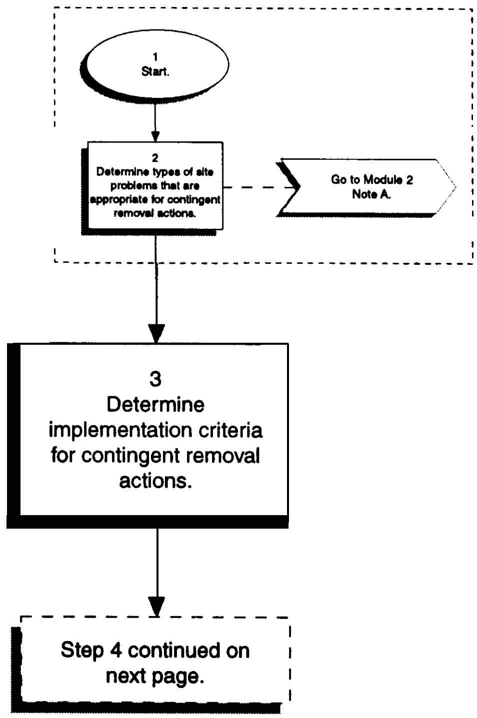
- These hot spots are often located in areas where workers are required to conduct other activities, thereby posing a risk if the hot spots are not removed.

- No special health and safety considerations are expected to be required to ensure a safe response for workers.

- Compliant storage capacity is currently available for approximately 6,000 yd^3 of material. Site workers trained in emergency response are available and can be mobilized within 24 hr to conduct the removal.

This evaluation process (not a detailed engineering evaluation) is similar to EPA's presumptive remedy evaluation process (EPA, 1993), which emphasizes the use of readily available information and the application of criteria that delineate key advantages and disadvantages of responding. The evaluation at the facility-level is most appropriately conducted by DOE and contractor personnel with OU-specific knowledge (e.g., DOE project manager or designee and cognizant contractor project managers) and most effectively developed through a series of well-focused meetings that integrate the regulatory agencies, as appropriate, to ensure their concerns are addressed. Module 2, Note A provides an example meeting agenda and list of attendees.

Module 2 Contingent Removal Action Approaches (cont.)



NOTE:
Implementation criteria should be defined objectively, unambiguously, and with reference to the methods that will be used to make the measurement.

Step 3. **Determine implementation criteria for contingent removal actions.** Once types of site problems are identified as likely candidates for contingent removal actions, the sitewide team that is convened to develop contingent removal action approaches needs to establish specific criteria that can serve as agreed upon triggers for taking the action and to ensure that potential actions have well-defined boundaries. Criteria are generally expressed in terms of decision rules (or if-then statements) that define when removal actions will be undertaken. An example criterion is: *"Concentrations of thorium above 15 pCi/g in the top 6 in. of soil in any 100 ft^2 area measured using the Soil Screening Facility Methodology will be removed. "*

Criteria should be defined unambiguously, objectively, and with reference to methods that will be used to make the measurement. An example of poor definition is . . . . . levels of thorium in soil that present a large risk. ” Several factors need to be evaluated when setting criteria. The most obvious is the urgency or risk posed by the problem. Other factors to be considered that might modify risk-based considerations include (1) the resulting size or scope of the removal (e.g., whether areas are likely to be small enough in scope to be handled without elaborate investigation and planning and whether interim wastes can be managed); (2) the degree of understanding that exists (e.g., whether problems are understood well enough to be undertaken with reasonable assurance of success); (3) cost (e.g., whether removals are affordable within existing funding structures); and (4) time (e.g., whether the removal can be accomplished in a reasonable amount of time).

Consistent with the NCP criteria, urgency is likely to be a major factor in determining the need for a response to a threat or release. Urgency should be indicated in the criteria by including concentration levels that indicate current risk (e.g., worker health and safety), threat of a release, and certainty of the existence of a release. Because removal actions focus on urgent situations, concentration levels in the criteria should be set at levels where clear risks exist (e, g., 1×10^{-3} or 1×10^{4} risk levels), rather than levels analogous to final cleanup standards.

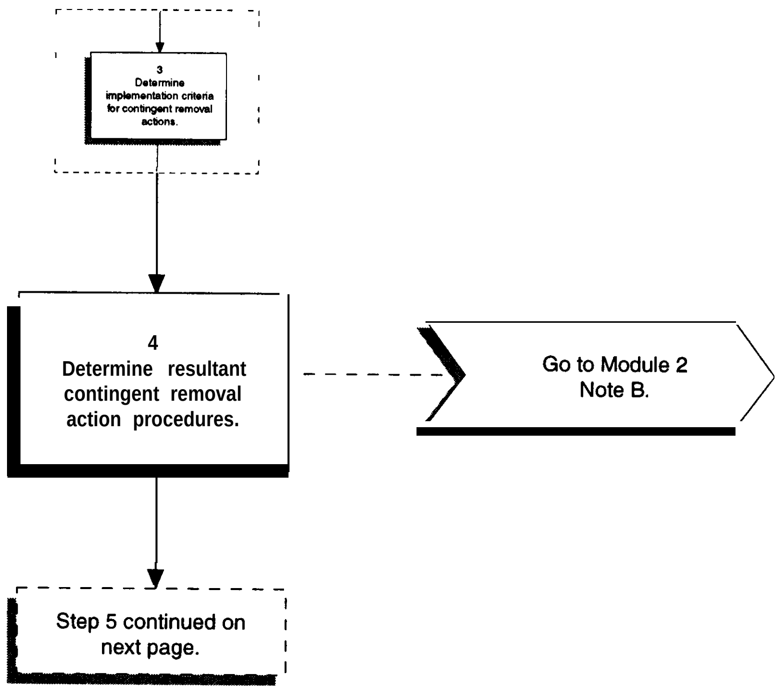
Appropriate concentration levels for criteria may be drawn from a variety of sources. They can be established using regulatory or guidance levels that indicate that action is warranted [e.g., proposed action levels in the draft Resource Conservation and Recovery Act (RCRA) Subpart S rule]; derived from accepted risk-based methodologies, equations, and assumptions [e.g., preliminary remediation goals (PRGs)]; established on the basis of anticipated exceedances of acceptable exposure levels from health and safety procedures or plans; or based on obvious visible evidence (e.g., drums with rust on more than 10 percent of the surface area). Agreement about the basis for urgency criteria will be a major focus in the planning process for contingent removal actions.

Scope criteria consider the extent of the response that would result. For example, a contingent removal action may be appropriate only within defined scope limits (e.g., maximum amount of soil that might be removed within available financial resources or within certain time frames). Scope often is a bounding factor for contingent removal actions, to ensure that the removals remain within NCP limits (i.e., 6 months planning) and practical limits that exist for a site. An example of a removal criterion modified by scope is: *"Concentrations of thorium above 15 pCi/g in the top 6 in. of soil measured using the Soil Screening Facility Methodology will be removed, if less than 25 yd^3 of material is present."*

Modifications to criteria can also result from the factors of *understanding*, *cost*, and *time*. Examples of how these factors could modify the example criterion are shown below:

Module 2 Contingent Removal Action Approaches (cont.)

NOTE:
Procedures for contingent removals can be expressed as decision rules. For example, if Thorium-238 is found above 15 pCi/g of soil in any 100 square foot area 6 inches deep within 5 feet of the surface measured using procedures specified in Appendix A for radionuclides in soil, and the total estimated volume is less than 100 cubic yards, then that volume will be excavated using onsite D&D personnel and equipment, stored in LSA boxes onsite until offsite waste acceptance criteria can be verified.



- *"Concentrations of thorium above 15 pCilg in the top 6 in. of soil measured using the Soil Screening Facility Methodology will be removed if samples confirm that no hazardous wastes or PCBS are present."* An example where sufficient waste characterization is needed to ensure that the materials can be placed in a storage unit only permitted to receive low-level radioactive waste.

- *"Concentrations of thorium above 15 pCi/g in the top 6 in. of soil measured using the Soil Screening Facility Methodology will be removed if total costs for the work are within available funding."* An example where DOE will conduct the activity only if no new funding request is needed.

- *"Concentrations of thorium above 15 pCi/g in the top 6 in. of soil measured using the Soil Screening Facility Methodology will be removed if work can be completed within 30 days from discovery of the problem."* An example where DOE and the regulators may agree on a reasonable time limit for the work; after this time period, the extended project team might agree that public notice of the work is desirable.

Step 4. **Determine resultant contingent removal action procedures.** Once a general type of site problem (e.g., surficial radioactive hot spots) has been identified as a candidate for contingent removal actions (Step 2), and criteria have been established for identifying appropriate specific cases (Step 3), the sitewide project team should specify the procedures that the contingent removal action will entail. These procedures may need to include the following:

- Technologies to be used and the conditions under which each can/should be used

- Responsibilities and authorities

- Contracting mechanisms, if any, to be used in conducting the work

- Counter-indications to continuing or completing the removal action

- Generic design for the removal that can be modified to fit the circumstances of a particular site problem

The range of available waste management technologies is currently limited for many problems that exist at DOE sites. The primary emphasis of the action for contingent removals will be on immediate risk reduction techniques rather than on making final decisions about treatment and disposal options. However, some consideration of the technical methods for accomplishing even contingent removals likely is warranted. Considerations during this step are decisions about excavation equipment, characterization and monitoring equipment, waste transport mechanisms, and waste management methods (e.g., types of storage containers).

For many types of problems, only one technology may be available given the constraints on contingent removals agreed upon by the extended project team and imposed by the NCP. Some decisions about methods and technologies can be left until after a problem is discovered, or some decisions may already be made in existing site-specific procedures. For example, protocols for using radiological detection instruments for soils may be agreed

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to and currently in use. In these situations, spending any resources on further discussion is unnecessary; rather, focus should be on technology issues where multiple options are available or where members of the planning team have concerns.

Planning should include defining roles and responsibilities and, if appropriate, for addressing procurement issues that will exist when implementing contingent removal actions. Roles and responsibilities should be clearly defined at this stage. Specific issues (e.g., which organizations will conduct the actions or how contractors will be selected to implement the removals) should be addressed to avoid later delays. For example, part of the procedures established for a contingent removal of a certain type could specify that facility emergency response staff will be used to excavate hot spots. Planning also must assess how auxiliary organizations (e.g., waste management or health physics) will be notified to provide staff to support the contingent removal. Ideally, representatives from all affected organizations should be involved as needed in planning contingent removal actions.

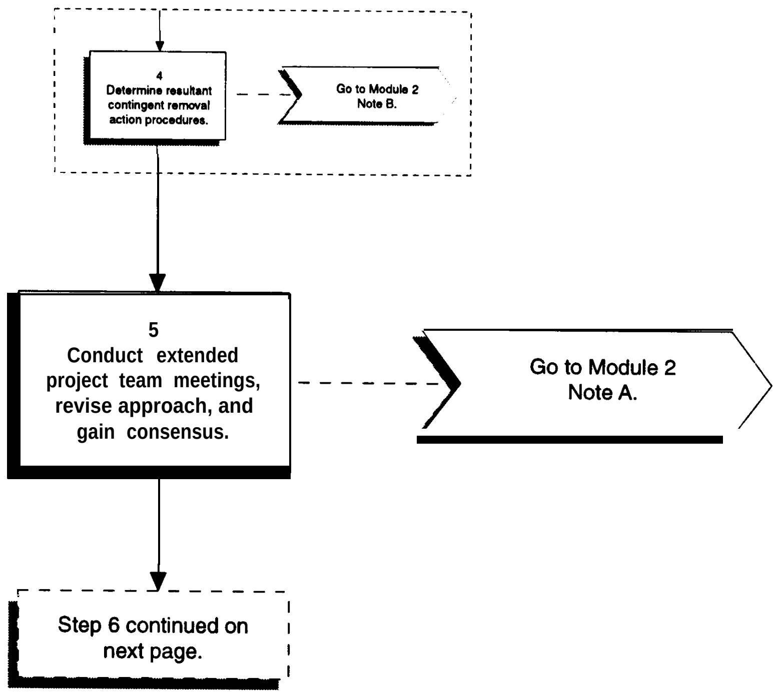
Finally, technical procedures, plans (e.g., health and safety), and generic design documents should be developed separately by DOE and DOE contractor staff. Existing procedures, plans, and design documentation can be relied on extensively and can even be incorporated by reference in most instances. Time-critical removals, whether undertaken as contingent removals or as separate ad hoc removals, should not require wholly separate plans, procedures, and technical documentation.

As with the criteria, the procedures for implementing contingent removals are often best expressed as decision rules. This results in clear definition of linkages among site problems, implementing criteria, and resulting procedures and also ensures effective communication of the contingent removal action concept to stakeholders and any contractors responsible for implementing contingent removal actions. For example:

If Thorium-238 is found above 15 pCi/g of soil in any 100 ft^2 *area 6 in. deep in the top 5 ft measured using procedures specified in Appendix A for radionuclides in soil, and the total estimated volume is less than 100* yd^3*, then that volume will be excavated using onsite D&D personnel and equipment, and stored in LSA boxes onsite until offsite waste acceptance criteria can be verified.*

Module 2 Contingent Removal Action Approaches (cont.)

NOTE:
Extended project team meetings (1) communicate internal DOE suggested approaches; (2) identify issues of concern to the extended project team; (3) resolve divergent viewpoints and arrive at a consensus; and (4) document the consensus.



or

	Criteria	Action
^{238}Th in surficial soils in the top 5 feet above criteria.	(1) ^{238}**Th** concentration greater than 15 pCi/g in any 100 ft^2 area, 6 inches deep measured using procedures in Appendix A, and (2) Estimated volume less than 100 yd^3.	(1) Excavation using onsite D&D personnel and equipment, (2) Onsite interim storage in disposal boxes, and (3) Verification of meeting offsite disposal waste acceptance criteria.

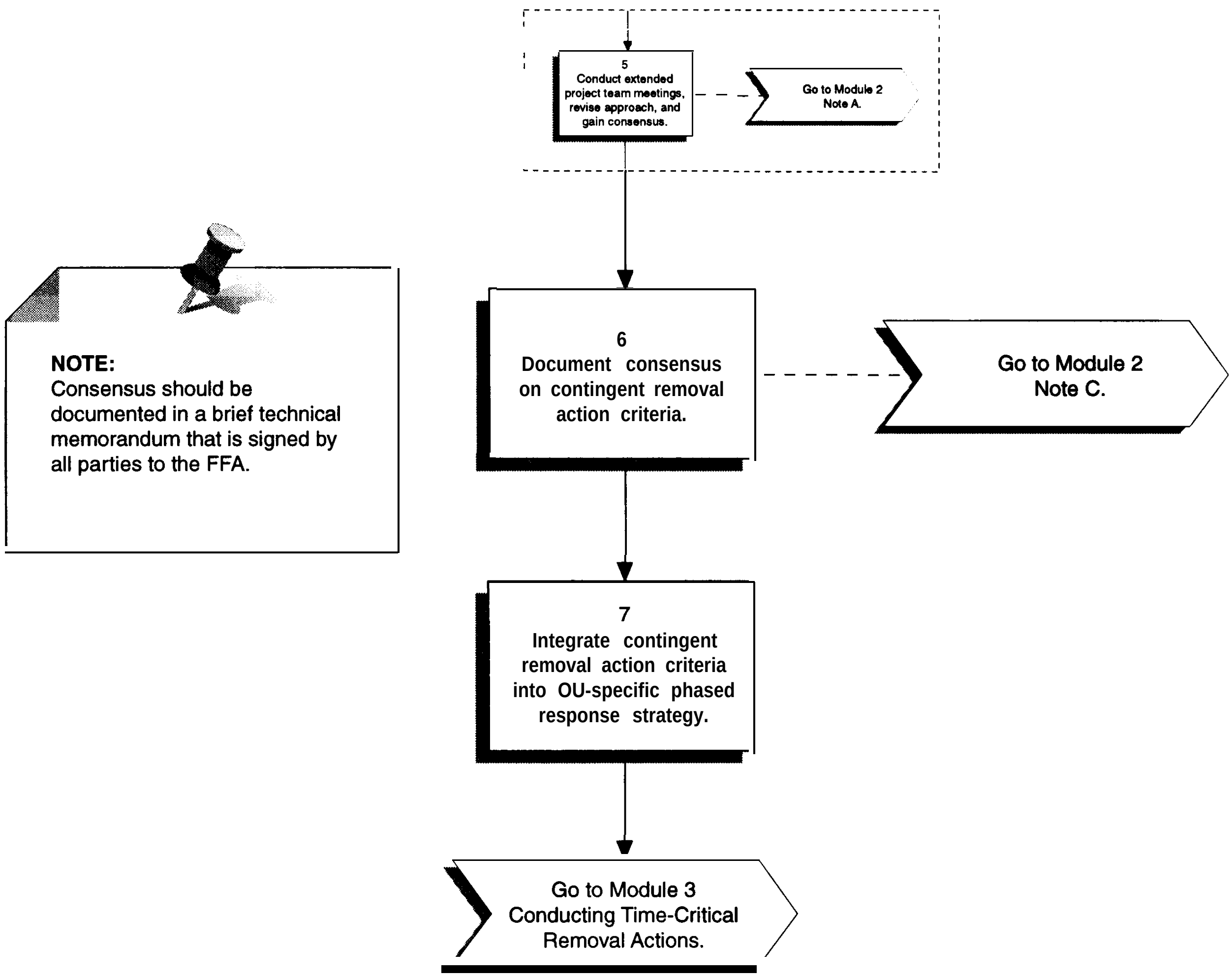
Module 2, Note B provides additional detail on defining contingent removal action decision rules.

Step 5. **Conduct extended project team meetings, revise approach, and gain consensus.** As contingent removal actions are planned, a series (as many as five or ten) of well-focused meetings are effective forums for achieving consensus. The meetings are intended (1) to communicate initial approaches developed internally by DOE and its contractors, (2) to identify issues of concern to the extended project team, (3) to resolve divergent viewpoints and arrive at a consensus approach to contingent removal actions, and (4) to document the consensus approach in a technical memorandum that can be incorporated into a phased response strategy.

Coordination of the meetings is DOE's responsibility as the lead agency. For example, the first meeting should be used to present DOE's initial approach to contingent removal actions and the rationale used in its development. Distributing written summaries, tables, and figures of DOE's initial approach can facilitate and supplement extended project team understanding. Module 2, Note A provides guidance on possible agendas and attendees.

Divergent viewpoints are part of this process. Facilitation (e.g., formal use of partnering techniques, use of mediator) can be used to reach agreement on how DOE's initial approach can be modified to meet extended project team expectations. The goal of the extended project team meetings is to document consensus. Because the meetings likely will be held over several days, recording points of consensus or divergence is critical. Such "working notes" form the basis for the technical memorandum used to document final consensus.

Module 2 Contingent Removal Action Approaches (cont.)



Step 6. **Document consensus on contingent removal action criteria.** The extended project team should document the scope and details of the consensus developed for each type of contingent removal. A brief technical memorandum should be developed and agreed upon by all parties to the FFA. The memorandum should cover each of the following topics:

- Type(s) of site problems and the criteria used to identify site problems for a contingent removal action
- Limitations on use of contingent removal actions
- Responsibilities and authorities
- Technologies and approaches
- Regulatory requirements
- Contingencies
- Waste disposal
- Monitoring requirements
- Site closure
- Existing facility plans and procedures

Module 2, Note C provides an example outline of documentation for a contingent removal action consensus.

Step 7. **Integrate contingent removal action criteria into OU-specific phased response strategy.** As described in Module 1 (Phased Response Strategy), a phased response strategy should be developed for each OU. The phased response strategy identifies for each site problem in the OU the type of remedial approach that will be used (time-critical removal, non-time-critical removal, early remedial action, final remedial action). Once established, contingent removal approaches can be incorporated into phased response strategies. Contingent removal actions become just one more tool at the disposal of the DOE project manager or designee to move an OU quickly and efficiently to remediation. See Submodule 1.1, Development of a Phased Response Strategy, for additional information on developing phased response strategies.

Note A. **Example Meeting Agenda for Discussion of a Contingent Removal Action Approach.**

DOE's Field Offices are responsible for developing a contingent removal action approach while gaining regulatory agency consensus. DOE's Environmental Restoration (ER) manager for the facility should designate an individual to lead the effort for the facility or a subpart of the facility (e. g., OU). Module 2, Step 2 explains the characteristics of actions that are good candidates for a contingent removal action. This example agenda and list of attendees provides a starting point for establishing the meetings where initial candidates are identified and criteria, procedures, and approaches are first developed. The extended project team is integrated into this effort through a series of well-focused meetings.

The extended project team is composed of DOE and DOE contractors and subcontractor personnel as appropriate for specific technical matters, EPA, the state regulatory agency(ies), and other identified stakeholder groups that take an active role in Environmental Restoration (ER) decision making processes. By expanding the project team beyond the routine technical matters that can be addressed by DOE contractors, a more complete and authoritative team is assembled – a team that can decide important matters and move a project toward a mutually satisfactory end point more quickly and efficiently than can be accomplished when technical matters are separated from policy matters. Participation of the extended project team members is vital to the project when developing contingent removal criteria, procedures, and approaches.

The purpose of the extended project team meetings is to present to the non-DOE members the initial candidates for contingent removals, along with any preliminary criteria, procedures, approaches, and draft decision rules that have been developed in the internal meetings. Follow-on meetings are then focused on modifying the initial approaches and developing consensus. Desired outcome of the meeting(s) is:

- Agreement that contingent removals have a role to play in the ER program for the site
- Agreement on an initial list of types of removals that can be implemented as time-critical actions under a contingent removal action program
- Agreement in principle on the general form that the criteria, procedures, approaches, and decision rules should take in the final program documentation
- Agreement on action items that result from the meeting and a timetable for developing each type of contingent removal

Attendees

DOE ER Manager (perhaps only part of the meeting)
DOE lead for development of contingent removal actions
DOE OU project managers, as appropriate
DOE regulatory specialist
DOE lead for FFA issues
ER Contractor lead for development of contingent removal actions

ER Contractor lead for development of contingent removal actions
ERContractor OU project managers, as appropriate
ER Contractor regulatory specialist
EPA lead for ER at the site
Other EPA personnel at the discretion of EPA
State regulatory lead for ER at the site
Other state agencies as appropriate
Other state personnel at the discretion of the state agencies
Other stakeholders appropriate

I. Background
   A. Contingent removals
   B. Type(s) of removals covered by the document
   C. Site experience with similar removal actions

II. Criteria and decision rule(s) for invoking a contingent removal action

III. Approach(es) to be used in implementing a time-critical removal
   A. Approved remediation technologies
   B. Waste Management
   C. Resources (e.g., contracting mechanisms, site personnel)
   D. Organization/Responsibilities
   E. Liaison with regulatory agencies and other stakeholders
   F. Site closure/post removal responsibilities

IV. Procedures
   A. Planning and project management (generic work plan)
   B. Contracting
   C. Budgeting and funding
   D. Health and Safety Plan
   E. Sampling and Analysis (monitoring) Plan
   F. Quality Assurance Project Plan
   G. Risk assessment approach
   H. Technical procedures governing the work

Note A: Example Meeting Agenda for Discussion of a Contingent Removal Action Approach (continued)

Note B. **Example Text for Development of Contingent Removal Action Decision Rules.**

Decision rules are if-then statements that define what action will be undertaken for a certain set of conditions. Decision rules for contingent removal actions are the crux of the agreement between the DOE facility and the regulators. They state in clear terms the conditions under which time-critical removal actions will be implemented without need for discussion between DOE and the stakeholders. The following examples can be used as starting points in developing decision rules for a site.

(If)

Radioactive hot spots can be addressed as time-critical removals under the following conditions:

- The contaminated soil does not exceed 15 ft in depth.
- The depth of the hot spot does not exceed 3 ft or any level that would require special considerations for worker safety during excavation.
- The total volume of soil to be removed does not exceed what can be contained in 50 drums.
- Storage capacity for the drummed waste is available in the Temporary Storage Facility (TSF) and addition of the removed waste will not cause the maximum allowed capacity of the TSF to be exceeded.
- The cost of the removal will not exceed $200,000.
- The removal can be accomplished in no more than one calendar month, from the beginning of mobilization to the completion of the drumming of the waste.

(Then)

Under the above conditions, DOE will remove the hot spots through use of the most efficient means available. The hot spots will be removed by suitable means, packaged in drums, labeled in accordance with the requirements of the TSF, and stored in the TSF pending completion of the grout facility. Health and safety procedures will fulfill the requirements of the Contingent Removal Health and Safety Plan, suitably modified and augmented for the particular site being remediated, Site (radioactive) surveying, monitoring during the removal, and confirmation monitoring will be conducted in accordance with the Hot Spot Removal Procedures Manual developed for contingent removals. Waste packaging, labeling, handling, and storage will be in accordance with the TSF procedures and requirements.

Note: This decision rule includes scope, time, and cost criteria, but does not address urgency or understanding criteria. Any surficia1 hot spot is assumed to represent a sufficiently serious potential for harm; it should be removed by the most expeditious means possible unless it is large enough (e.g., greater than 50 drums) that it might be better addressed by stabilization, institutional controls, or other means until a permanent disposal option is available. A further assumption is that hot spots are a simple enough problem that they do not present special consideration on a case-by-case basis. Thus, the decision rule is not required to address levels of uncertainty acceptable in making go/no-go decisions in regard to hot spot removals.

Note C. **Example Outline of Documentation for Contingent Removal Action Consensus.**

Documentation of the program as it will be implemented is necessary once the contingent removal criteria, procedures, approaches, and decision rules have been developed for a particular type of removal (e.g., hot-spot removals at the applicable DOE site). The documentation does not have to be elaborate or extensive. With some notations of differences or exceptions, much of the procedures will be incorporated by reference to existing procedures. The key element of the documentation, other than the procedures, is the decision rule for invoking a contingent removal. This should have been covered in detail in the extended project team meeting and should be a matter of consensus among the stakeholders.

The following outline is illustrative only. The special needs of each site should dictate the level and organization of the documentation needed for a contingent removal program.

I. Background
   - A. Contingent removals
   - B. Type(s) of removals covered by the document
   - C. Site history with similar removal actions

II. Criteria and decision rule(s) for invoking a contingent removal action

III. Approach(es) to be used in implementing a time-critical removal
   - A. Approved remediation technologies
   - B. Waste management
   - C. Resources (e.g., contracting mechanisms, site personnel)
   - D. Organization/Responsibilities
   - E. Liaison with regulatory agencies and other stakeholders
   - F. Site closure/post removal responsibilities

IV. Procedures
   - A. Planning and project management (generic work plan)
   - B. Contracting
   - C. Budgeting and funding
   - D. Health and Safety Plan
   - E. Sampling and Analysis (monitoring) Plan
   - F. Quality Assurance Project Plan
   - G. Risk assessment approach
   - H. Technical procedures governing the work

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Module 3
Time-Critical Removal Actions

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• Developing Action Memorandum/ Removal Site Evaluation
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• Resolving Logistics for the Removal Action

Module 3
Time-Critical Removal Actions

Background

As part of a phased response strategy, time-critical removal actions are used to respond to threats or releases where planning can be completed in less than 6 months following issuance of an Action Memorandum. This module focuses on the planning and documentation requirements for time-critical removal actions and emphasizes ways in which the decision and design support phase can be streamlined and the documentation abbreviated (Figure 1 in the Introduction provides definition of the planning, and decision and design support phases).

The only regulatory distinction between the time-critical removal actions addressed in this module and the longer term actions addressed in Module 4, Non-Time-Critical Removal Actions and Early Remedial Actions, is that time-critical removal actions can be planned within 6 months, while the planning for longer term actions has no time limit. In fact, time-critical removals often are planned in a matter of weeks, while the longer term actions in Module 4 can easily require a year or more of investigation and planning before action begins.

Characteristics of situations appropriate for time-critical removal actions are:

- A release or threat of a release requires near-term action.
- The required response is fairly obvious and straightforward.
- Temporary or final waste management capacity is available.

A time-critical removal action can be implemented whenever these criteria are met. Examples of releases or potential releases appropriate for a time-critical removal are:

- Chemical or radiological hot spots that are readily removable and will be disposed of in an available onsite low-level radioactive waste (LLW) disposal facility
- Liquids leaking from drums that can be removed, overpacked, and temporarily stored onsite
- Solvent in soil that can be extracted using a temporary soil vapor extraction system

The Environmental Protection Agency (EPA) has established documentation requirements and procedural requirements for time-critical removal actions, which are incorporated into this module. The Department of Energy (DOE) has published procedural guidance for removal actions in CERCLA *Removal Actions*, which should be consulted as appropriate.

Executive Order 12580 delegated CERCLA Section 104 authority to the Secretary of Energy, making DOE the lead agency for removal actions at DOE sites. In this role, DOE has discretion in implementing time-critical removal actions and does not require approval from EPA or state regulatory agencies for their initiation. However, DOE field offices should not operate independently of regulatory agency or public involvement in implementing time-critical removal actions. Efficient development and implementation of time-critical removals will be best ensured by developing a cooperative working relationship with the regulatory agencies and other stakeholders.

Consensus on the need for and the scope and objectives of a time-critical removal action is developed by the extended project team in two ways:

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- Through the development of a consensus memorandum under a phased approach (see Module 1, Phased Response Strategy)

- Through the issuance of an action memorandum addressing a single action

Organization

Module 3 discusses the following:

- Developing the Conceptual Site Model
- Identifying Compliance Issues
- Developing removal action approach
- Developing Action Memoranduml/Removal Site Evaluation
- Developing Removal Action Work Plan
- Facilitating community involvement
- Resolving logistics for the removal action

In addition, more detailed information is provided in the following notes:

- Note A – Example Conceptual Model for a Time-Critical Removal Action at Mound

- Note B – Example Action Memorandum for a Time-Critical Removal Action at Idaho National Engineering Laboratory

- Note C –Example Outline for an Action Memorandum: Time-Critical Removal Action

- Note D –Example Outline of Removal Action Work Plan

- Note E– Example Design Basis for a Time-Critical Removal Action at Mound

- Note F –Time-Critical Removal Action Logistics Checklist

Sources

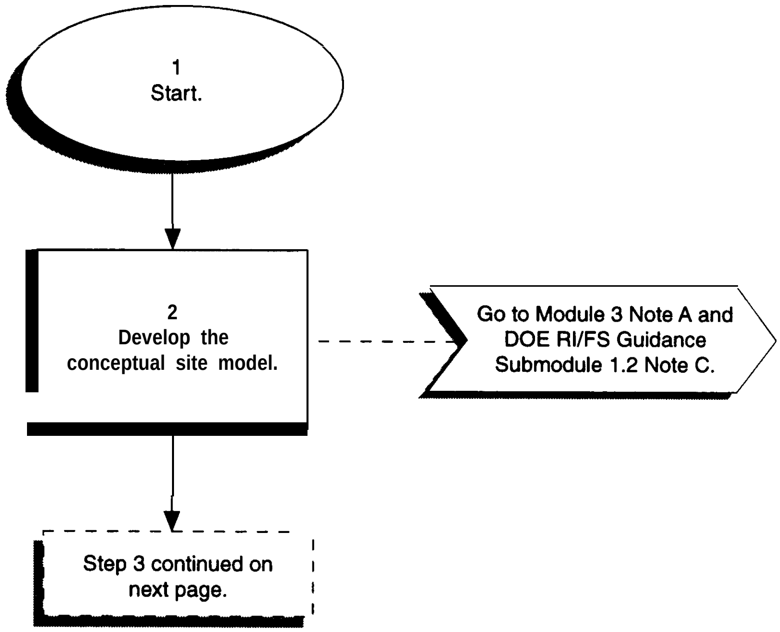
1. U.S. DOE, U.S. EPA, May 25, 1995, *Policy on Decommissioning of Department of Energy Facilities Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), p.4.*

2. DOE. September 1994. *CERCLA Removal Actions. DOE/EH-0435.*

3. *40* CFR 300, March 8, 1990, *National Oil and Hazardous Substances Pollution Contingency Plan,* Federal Register, Vol. 55, No. 46 Rules and Regulations.

4. U.S. EPA, August 1993, *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA, EPA/540/R-93/057,* OSWER Directive 9360.0-32.

Module 3 Time-Critical Removal Actions



Step 1. Start.

Step *2.* **Develop the conceptual site model.** On the basis of available information, develop a conceptual site model of the problem and all features of the site that may impact the planning or implementation of the envisioned action. The conceptual site model is a summary of all available information about the site problem(s) being addressed, a combination of text and diagrams to provide a qualitative and (to the extent possible) quantitative understanding of the site problem(s).

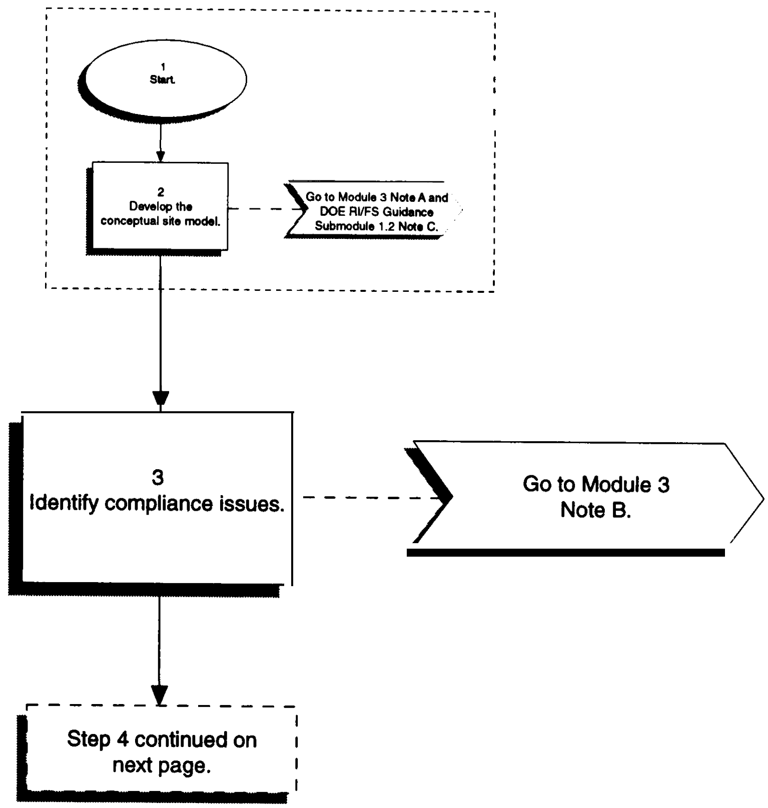
The conceptual site model is used to present site understanding in both the Action Memorandum/Removal Site Evaluation (Step 5) and the Removal Action Work Plan (Step 6). It serves three distinct purposes in a time-critical removal action:

- As the basis for identifying compliance issues that must be addressed by the time-critical removal action (see Step 3, below)
- As the basis for developing the removal action approach (see Step 4, **below)**
- As part of the assessment of the site problem required in the Removal Site Evaluation, including agreement of approach for data collection, if necessary (see Step 5, below)

The conceptual site model does not need to be elaborate or detailed. For example, if the action is to remove and stabilize drums of wastes, the critical areas of interest for the conceptual site model may be only the nature of the contents of the drums and the condition of the drums. If removal of contaminated soil under the drums is part of the action, the scope of the conceptual site model will have to be expanded to incorporate all that is known about the contaminated soil and all that might impact the planning for or implementation of the removal action. Module 3, Note A and DOE's RI/FS guidance, Submodule 1.2, Note C provide examples of conceptual site models. The example in Note A to this module was sufficient to support a particular time-critical removal action.

The conceptual site model also presents and explains uncertainties about the site problem(s) to be addressed by the removal action. Uncertainties are important if they represent potential changes to the remediation approach that might have to be made during the removal. For example, if the volume of contaminated soil for removal is not known with sufficient accuracy to ensure that available storage, treatment, or disposal capacity will be sufficient, then contingency plans for dealing with a larger than expected volume of soil will be critical. Each uncertainty potentially creates the need for a contingency plan that should be developed as part of the remediation approach (see Step 4). In some instances, these contingency plans will describe alternative actions to be taken; in other instances, the contingency plan for a given uncertainty may be to stop the action. For detailed guidance on developing and evaluating site understanding in early action see Submodule 4.1, Scoping. For detail on contingency planning see DOE's RI/FS Guidance Submodule 5.1, Alternatives Definition, and Module 7, SAFER.

Module 3 Time-Critical Removal Actions (cont.)



Step 3. **Identify compliance issues.** The beginning point of a time-critical removal action is a decision that a response is needed (i.e., something must be done about the release or threat of release) and agreement on the general nature of the response that will be undertaken. Once the decision has been made about whether to and/or how to respond, focus then shifts to the requirements that must be met while conducting the time-critical removal action.

Compliance issues that must be addressed:

- Assessment of applicable or relevant and appropriate requirements (ARARs)
- Statement of endangerment requiring a removal action

For removal actions, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requires compliance with ARARs *to the extent practicable.* Determination of what is practicable is, to a large degree, based on the subjective judgment of DOE as the lead agency; however, gaining concurrence from the regulatory agencies on what is practicable will help ensure continued support of the extended project team. ARARs that affect worker health and safety, ARARs that are directly relevant to the actions being implemented (i.e., action-specific ARARs), and ARARs that cannot be deferred until the final ROD are generally complied with.

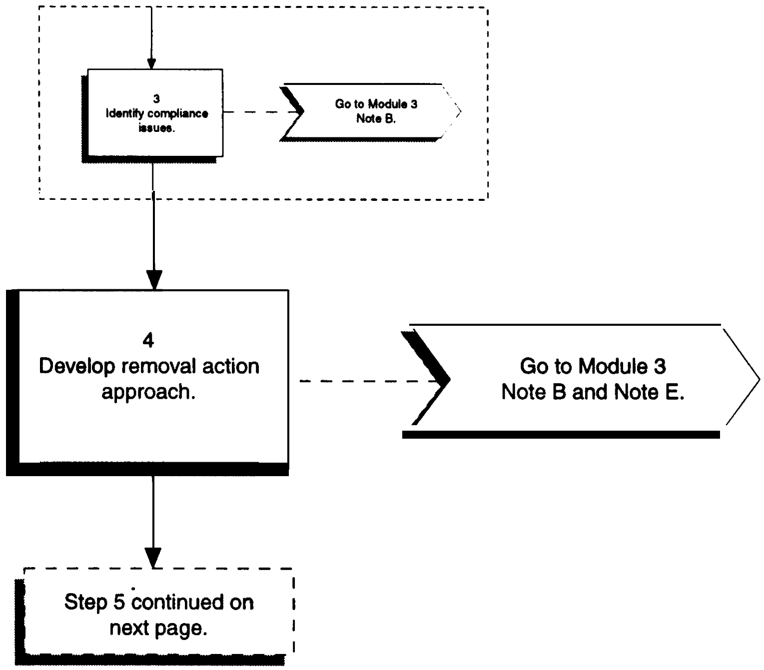
Module 3, Note B provides an example ARARs assessment as part of an Action Memorandum for a time-critical removal. This is an example of how “to the extent practicable” was interpreted for a specific action.

A risk assessment or risk evaluation is not required for a time-critical removal action. In remedial actions, risk assessments are generally used to demonstrate that a site poses a risk that requires action and to evaluate the effectiveness of various remedial alternatives. Neither of these purposes is relevant to a time-critical removal action because the only requirement to justify action is that one or more of the criteria listed in the NCP is met.

In accordance with NCP criteria [Section 300.415(3)(b)], a removal action may be appropriate where:

- DOE (as the lead agency) identifies the existence of a threat to public health and welfare or the environment, regardless of whether the site is included on the National Priorities List (NPL).
- Actual or potential exposure to nearby human populations, animals, or the food chain from substances or pollutants or contaminants is found.
- Actual or potential contamination of drinking water supplies or sensitive ecosystems is found.
- Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release are found.

Module 3 Time-Critical Removal Actions (cont.)



- Migration of high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface is possible.

- Weather conditions may cause hazardous substances or pollutants or contaminants to migrate or to be released.

- Threats of fire or explosion are found.

- No other appropriate federal or state response mechanisms exist for responding to a release or threat of a release.

- Other situations may pose threats to public health or the environment.

Note that it is not necessary to demonstrate actual risk or even actual contamination. Potential risk or potential contamination are sufficient. Risk evaluation is made unnecessary by the urgency of the action being taken, by the focused nature of the action, and by the later opportunity (during final site actions) to address any residual risk not removed or mitigated by the removal. The statement of endangerment required in the Action Memorandum is supported by illustrating how the site problem meets one or more of the NCP criteria that warrant a removal action. Module 3, Note B provides an example of an endangerment statement for a time-critical removal. Worker health and safety issues are considered in the design and implementation of the removal action (see Step 4),

Step 4. **Develop removal action approach.** The removal action approach serves as the basis for implementing the removal action. The removal action approach is the technical approach that will be used to address the release or threat of release and comply with ARARs to the extent practicable. Development of a time-critical removal action approach is analogous to the design step; also by way of analogy, it is a combination of two steps (defining and designing an alternative) of a longer term action (see Submodules 4.3, Preconceptual Design, and 4.5, Conceptual Design). These two steps are combined in a time-critical removal action in order to streamline the response.

Development of the removal action approach will require a design team that typically integrates (if possible) the team that will perform the action.

The general outline of the response action typically is well established by this point (e.g., removal of volatiles from the subsurface by soil vapor extraction). However, the general intent of the action must be refined into an explicit statement of measurable objectives of the action. These objectives will be used for judging the adequacy of the approach and the success of the action.

The three basic approaches for establishing the objectives of a time-critical removal action are ARARs-based, cost/scope-based, and action-based. Any one or any combination of these approaches is acceptable. For example:

- **ARARs-based.** Thorium-contaminated soil will be removed in the top 6 in. of soil to the action level of 5 pCi/g established in the DOE guidelines.

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- **Cost/scope-based.** Beginning with the most contaminated areas in the southwest corner of the fenced area, the hot spots will be stabilized by placement of temporary cover material. The extent of the action is limited to the funding available this fiscal year, not to exceed $250,000.

  Thorium-contaminated soil will be removed in the top 6 in. of soil above 5 pCi/g, until a maximum 500 yd^3 is removed and stored at the interim storage facility.

- **Action-based.** Drums containing strontium-contaminated liquids will be removed, overpacked, and placed in temporary storage.

Key uncertainties and data gaps in the understanding of the site or the site problems can be managed in two ways:

- Collecting additional data that reduce (or perhaps eliminate) the uncertainty

- Developing contingency plans to accommodate the uncertainty if it creates a need to modify the remediation approach in the field

Extensive data collection prior to action generally is not feasible for a time-critical removal action. Examples of limited data collection that may be feasible for a time-critical removal action (i.e., less than 6 months planning) include using rapid turnaround methods to provide quantitative and qualitative information to:

- Reduce uncertainty of contaminated soil volume.

- Provide information meeting waste acceptance criteria.

- Provide information to ensure that worker health and safety will be protected during the action.

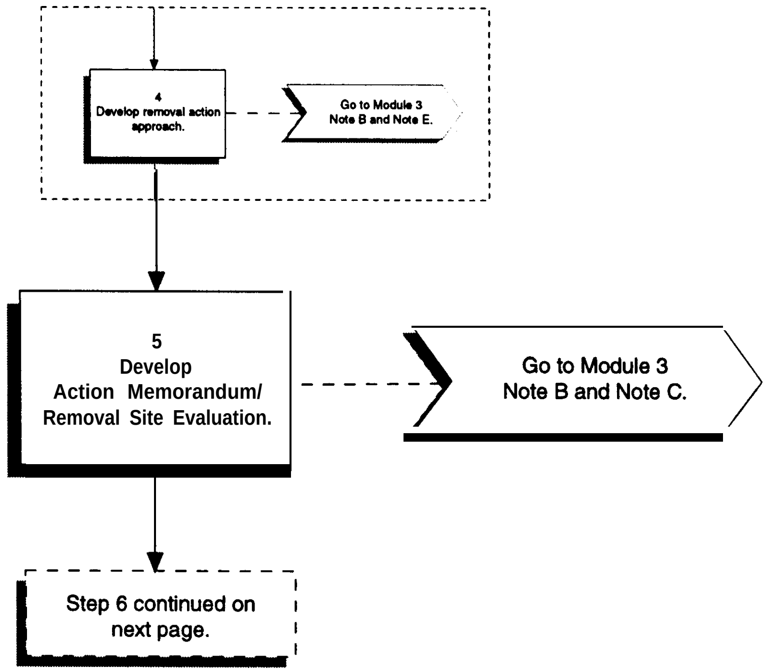
Major uncertainties and data gaps that cannot be managed or addressed using very limited data collection activities generally cannot be tolerated for a time-critical removal action. Any unknowns that render implementation or probable success of the action highly uncertain may require more involved study than is feasible within a 6-month period, and generally, such required study would place the problem outside the scope of a time-critical removal action. If extensive data collection is required to reduce uncertainties or if key uncertainties cannot be resolved through development of contingency and monitoring plans (see Step 4, below), the site problem may be more appropriately addressed through a longer term response (see Module 4, Non-Time-Critical Removal Actions and Early Remedial Actions).

The final removal action approach must ensure the following:

- That all compliance issues can be resolved

- That any uncertainties in the removal action approach are acceptable and can be managed through developing/implementing contingency plans

Module 3 Time-Critical Removal Actions (cont.)



- That logistical issues can be identified before implementing the removal action approach

- That a cost estimate of acceptable accuracy for completing the action is feasible, as based on the detail to which the response has been defined/ designed

- That removal action objectives can be substantially met

The removal action approach should be brief (e.g., less than 10 pages). It should include a description of the approach, an assessment of how it achieves compliance (e.g., removal action objective), and a cost estimate. It will appear in both the removal action Work Plan and the Action Memorandum/Removal Site Evaluation. Module 3, Note B provides an example removal action approach as included in an Action Memorandum. Module 3, Note E provides an example removal action approach from a removal action work plan.

Step 5. **Develop Action Memorandum/Removal Site Evaluation.** The NCP requires that a removal site evaluation be conducted and that an action memorandum be prepared in order to document the basis and intent of undertaking a removal action. To streamline the planning phase, the Removal Site Evaluation and Action Memorandum are written together and incorporated into a single document.

For a removal action, the Removal Site Evaluation fulfills the purposes served by the Remedial Investigation (RI) report and the Feasibility Study (FS) for a Remedial Action. It presents the understanding of the site as based on the available information (e.g., results of site inspection or preliminary assessment) and it explains the possible responses that could be taken (typically focusing on one fairly obvious solution). By presenting a preferred alternative, the Removal Site Evaluation goes one step further than an FS. In the Remedial Action process, this is left to the Proposed Plan. (For more detailed information on the Removal Site Evaluation see Submodules 4.1, Scoping, and 4.6, Remedy Selection and Documentation.)

Given the limited planning time available for a time-critical removal action, the Removal Site Evaluation often is based entirely on available information and does not report the results of any new investigation of the site.

The purposes of the Removal Site Evaluation are:

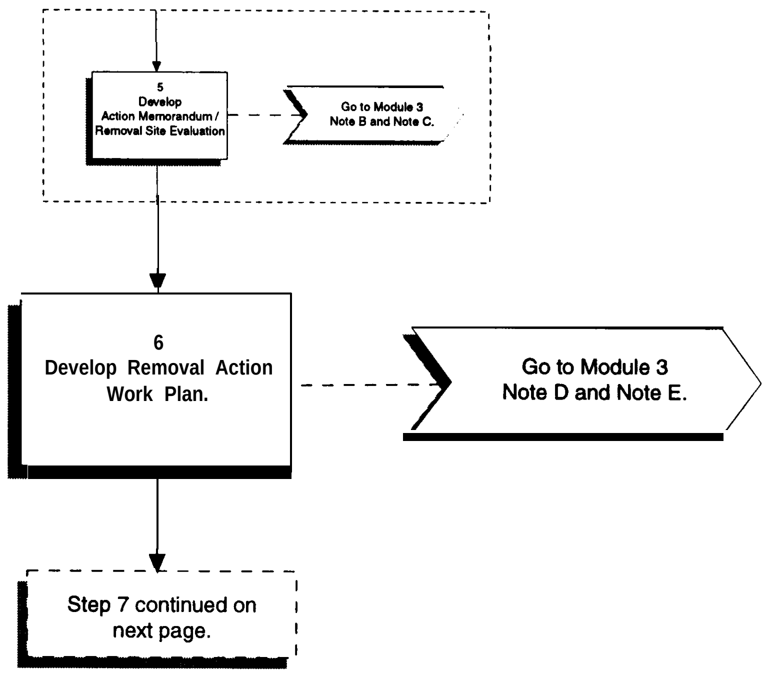
- To assess the site problem(s) addressed by the removal [The conceptual site model (see Step 2, above) is the basis for the assessment.]

- To establish that a removal action is appropriate for addressing the occurrence of a release or the potential for a release

- To document the objective(s) of the removal action

- To identify (briefly) the alternative(s) considered for the removal action and to identify the preferred alternative

Module 3 Time-Critical Removal Actions (cont.)



- To evaluate the preferred alternative for cost, effectiveness, and implementability [The removal action approach (See Step 4, above) is the basis for the evaluation.]

- To present a recommendation to proceed with a removal action

The Removal Site Evaluation also provides the basis for planning a limited data collection through a limited field investigation (LFI) in the removal action work plan (see Step 6, below) if required for addressing key uncertainties before initiation of a time-critical removal.

The following essential elements of the Action Memorandum are presented as the Removal Site Evaluation: (1) identification and description of the site problem(s) to be addressed by the removal (conceptual site model developed in Step 2); (2) evaluation of the urgency of the response (compliance issue addressed in Step 3); (3) identification of the objective of the time-critical removal action; (4) description of the removal approach that will be used to achieve the objective (developed in Step 4).

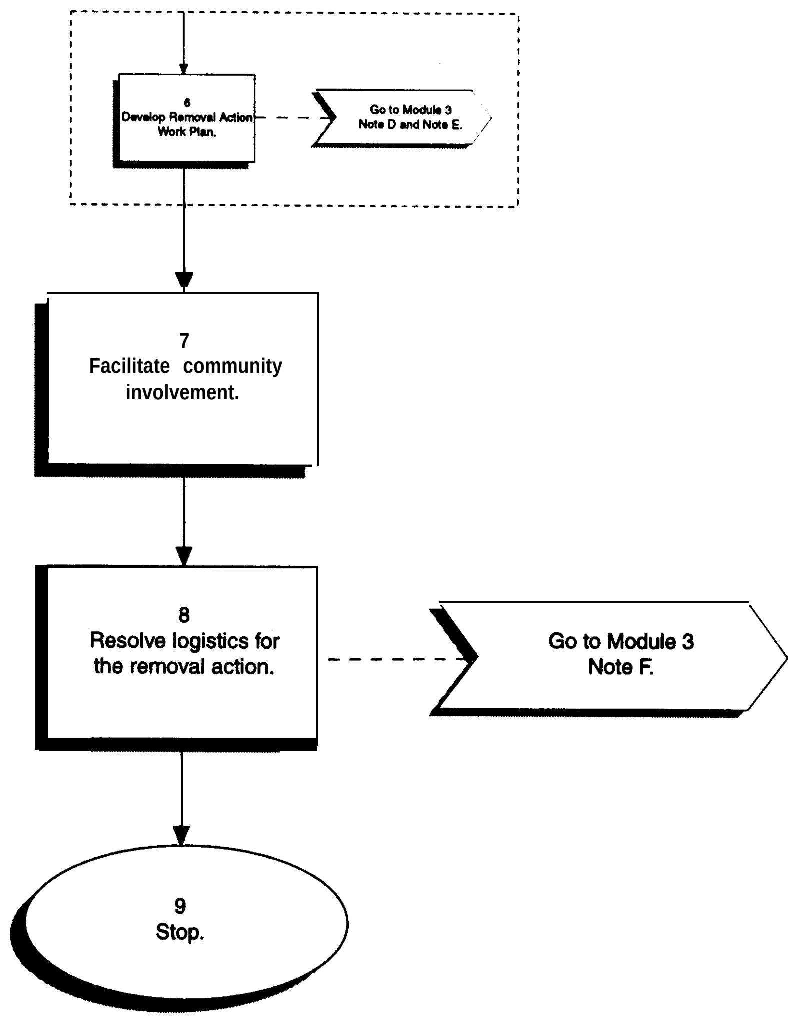
For a removal, the Action Memorandum serves the role of the Record of Decision (ROD) in a remedial action. That is, the Action Memorandum is the document that formalizes the lead agency's decision to undertake a removal action under CERCLA (Section 104) authority. Additional detail on preparing action memoranda is provided in Module 4, Non-Time-Critical Removal Actions and Early Remedial Actions. An example Action Memorandum for a time-critical removal action is provided in Module 3, Note B. The required elements for the Action Memorandum are presented in an example outline in Module 3, Note C, which provides additional detail specific to combined Action Memorandum/Removal Site Evaluations for time-critical removals.

CERCLA statutory limits on removal actions (i.e., 1 year and $2 million) do not apply to DOE removal actions because they are not fund financed (DOE/EPA, 1995). Facility-specific Federal Facilities Agreements (FFAs) should be examined to assess whether the limitations apply.

Step 6. **Develop Removal Action Work Plan.** Once the decision is made to proceed with the removal, a work plan is needed to outline the "who," "what," "when," and "where". The "why" was outlined in the Removal Site Evaluation/Action Memorandum and can be referenced as necessary in the work plan. The Action Memorandum included statements of "what" would be done through the removal, but those statements are necessarily somewhat general and do not provide sufficient detail for actual implementation of the removal. The work plan outlines the detailed steps for implementing the removal. For a time-critical removal action, the work plan combines the purposes of the work plan for a longer term early action (see Submodule 4.1, Scoping) and the design for the removal. (Although final design is beyond the scope of this guidance document, Submodules 4.3, Preconceptual Design and 4.5, Conceptual Design provide guidance on the early steps of design for a removal.)

The work plan complements the Action Memorandum, carrying the development of the removal approach to a fully implementable plan. The work plan must provide the following:

Module 3 Time-Critical Removal Actions (cont.)



- Complete design for the removal action

- Procedures for the removal action incorporated as the following appendices: (l) Quality Assurance Project Plan, (2) Health and Safety Plan; (3) Sampling and Analysis Plan (SAP); and (4) Waste Management Plan

- Management Plan. This should include the schedule, cost estimates, organization chart (with roles and responsibilities), and a procurement plan, if required.

To the extent possible, existing plans or standard procedures should be referenced or adopted in order to avoid developing the plans from scratch. For example, facility decommissioning procedures may have a pre-approved SAP for meeting waste acceptance criteria. Module 3, Notes D and E provide an example outline and sections of a work plan for a time-critical removal action at a DOE site.

Step 7. **Facilitate community involvement.** For a typical time-critical removal action, the limited time available before the action must commence means that the facility will not have opportunity to provide for public participation before initiating action. Instead, community involvement is usually arranged concurrent with the action. The NCP requires that DOE

- Publish a notice of availability of the Administrative Record in a major local newspaper of general circulation within 60 days of initiation of onsite activity.

- Provide a public comment period as appropriate of not less than 30 days from the time the Administrative Record file is made available to the public for inspection.

- Prepare a written response to significant written comments.

In all instances, the DOE facility should involve the public as soon as time allows. For example, if time is available, a draft of the Action Memorandum might be released to the public for comment prior to initiating action.

Step 8. **Resolve logistics for the removal action.** Once the Action Memorandum is signed and the action is designed, implementation should be all that remains. Numerous logistical issues have to be resolved prior to and during mobilization. This step falls under implementation of the removal action and is therefore outside the scope of this guidance document. However, as partial guidance, Module 3, Note F provides a detailed checklist of logistic issues with discussions of the importance of each.

Step 9. Stop.

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Note A. **Example Conceptual Model for a Time-Critical Removal Action at Mound.**

The following is an example conceptual model excerpted from a removal action work plan at the Mound Plant. Module 3, Note E provides another excerpt from the same work plan and additional detail on the specific action.

The purpose of this example is to illustrate the development of a conceptual model that focuses on a single site problem rather than on a conceptual site model as described in DOE's RI/FS guidance, in which the model provides a summary of all site problems in an operable unit.

This conceptual model was used to provide the basis for the design of the removal action for the expected conditions and for an uncertainty analysis conducted as part of the design basis. These are illustrated in Module 3, Note E.

The development of the conceptual model and expected conditions was the focus of several meetings between DOE, its contractor, and subcontractor. The brevity of the conceptual model illustrates the effort of the project team in concisely summarizing relevant information for use as a design tool.

actinium-227, 1,400 pCi/g, occurred at a depth of approximately 12 feet, although contamination was measured at other locations at depths between approximately 6 feet and 20 feet. It is assumed, however, that subsurface contamination extends to a depth of 23 feet. The asphalt and concrete surfaces are not expected to be contaminated. Samples from boreholes C-008 and C-009 exhibited maximum radium-226 concentrations of 2.0 pCi/g. Results from B-16 sample analysis show a thorium-232 concentration of 25 pCi/g at a depth of 4-6 feet. Thorium-232 contamination is expected to be encountered from the soil surface to a depth of 6 feet. Although not reported in the results from boreholes C-008, C-009, and B 16, thorium-228 is reported to have been deposited with the actinium-contaminated soil.	**Previous field sampling helps establish expected conditions.**
A review of historical information indicates that no transuranic wastes are present and no hazardous materials are present above regulatory levels. Also, based on the background information presented in Section 1.3, the actinium-227 contamination is concentrated around the former septic tank rather than being dispersed throughout the subsurface region.	**Process information helps establish expected conditions.**
Soil gas surveys were performed in Area 7 in 1992 (DOE 1992a). Each sample was collected at a depth of five feet. Of a total of 53 samples collected from Area 7, two were from locations within the removal action control zone. Total VOC's detected at these locations were 39 ppb and 13 ppb. At the former location, the total consisted entirely of Freon-113. These results are consistent with the observations from B-16 (Appendix A) in which 8-10 ppm was measured by the OVA at the borehole surface when the split spoon sample from the 4-6 feet depth was extracted from the borehole. For the proposed depth of the removal action, B-16 drilling measurements indicate the highest OVA readings occurred at 18 feet BGS (200 ppm) and 24 feet BGS (900 ppm).	
2.2.2. **Subsurface Material**	
The subsurface conditions in the area of the suspected septic tank were obtained from the B-16 and B-3 boring logs. Figure 2.2. shows the strata to a depth of 52 feet. The subsurface material consists of silty sand and gravel in the upper ten feet and between 16 feet and 20 feet. Clay is found between 10 and 16 feet and from 20 feet to 40 feet. It is assumed that any debris encountered during the excavation will comply with Mound Waste Stream AMDM-000000012 (WS12) criteria as defined in manual WD-10332	**Expected site conditions.**

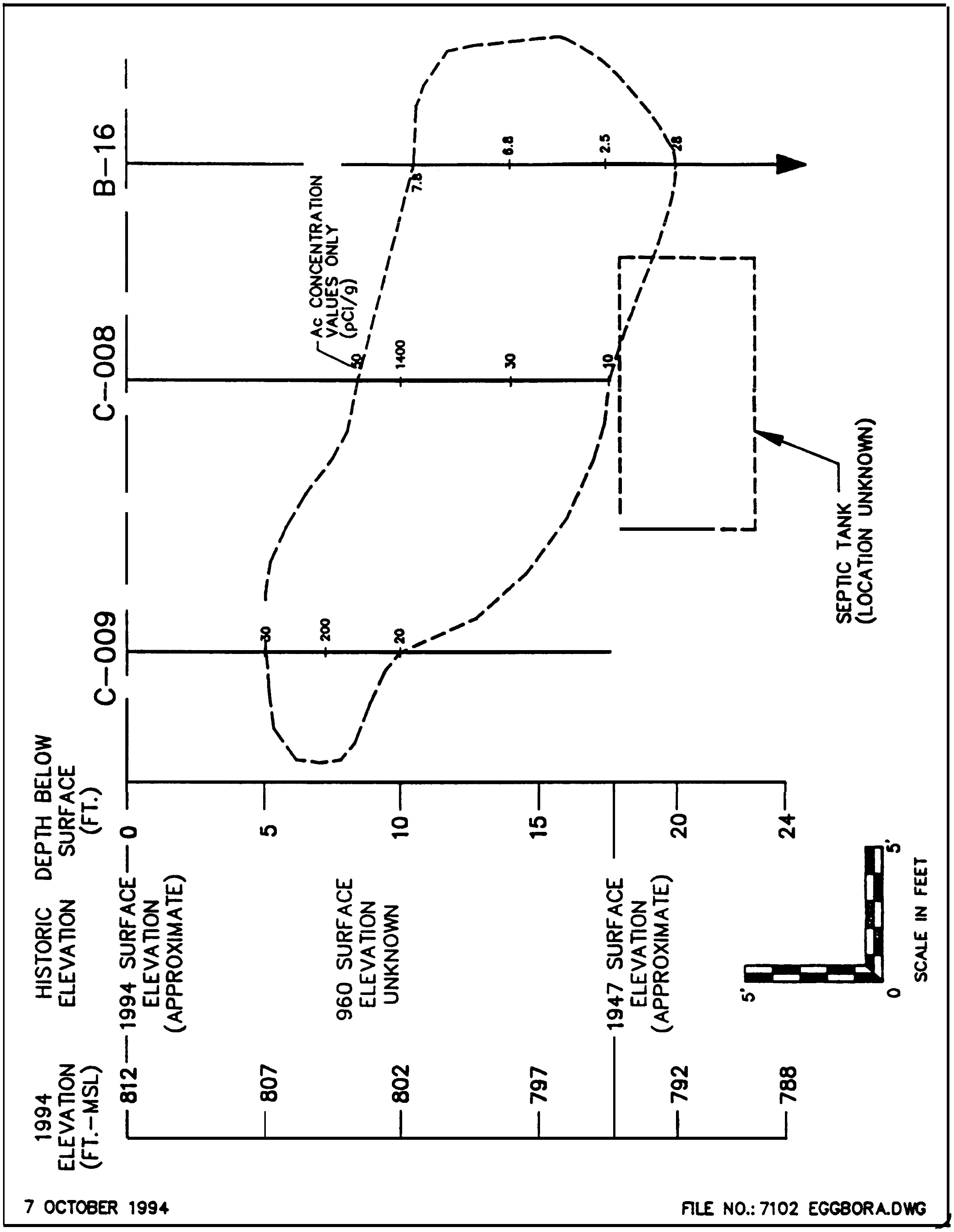

Figure 2.1. Conceptual Model

actinium-227, 1,400 pCi/g, occurred at a depth of approximately 12 feet, although contamination was measured at other locations at depths between approximately 6 feet and 20 feet. It is assumed, however, that subsurface contamination extends to a depth of 23 feet. The asphalt and concrete surfaces are not expected to be contaminated. Samples from boreholes C-008 and C-009 exhibited maximum radium-226 concentrations of 2.0 pCi/g. Results from B-16 sample analysis show a thorium-232 concentration of 25 pCi/g at a depth of 4-6 feet. Thorium-232 contamination is expected to be encountered from the soil surface to a depth of 6 feet. Although not reported in the results from boreholes C-008, C-009, and B 16, thorium-228 is reported to have been deposited with the actinium-contaminated soil.

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Process information helps establish expected conditions.

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Expected site conditions.

2.2.3. <u>Groundwater</u>

As shown in Figure 2.2., groundwater was encountered in borings B-16 and B-3 at 17 feet BGS in a silty sandy gravel strata. Based on available information and discussion with the Mound Hydrogeologist, it is assumed that this represents a perched water zone and that the underlying clay strata acts as an aquitard. Based on the depth to groundwater, the top of the confining clay layer at 21 feet, and the assumption that the perched water zone is laterally discontinuous, it is estimated that recharge rates to the aquifer range from 10,000 to 20,000 gallons per day (gpd) and that the reservoir contains approximately 360,000 gallons. No groundwater contamination has been detected in the vicinity of the removal action.

Assumptions help define expected conditions.

2.2.4 <u>Septic Tank</u>

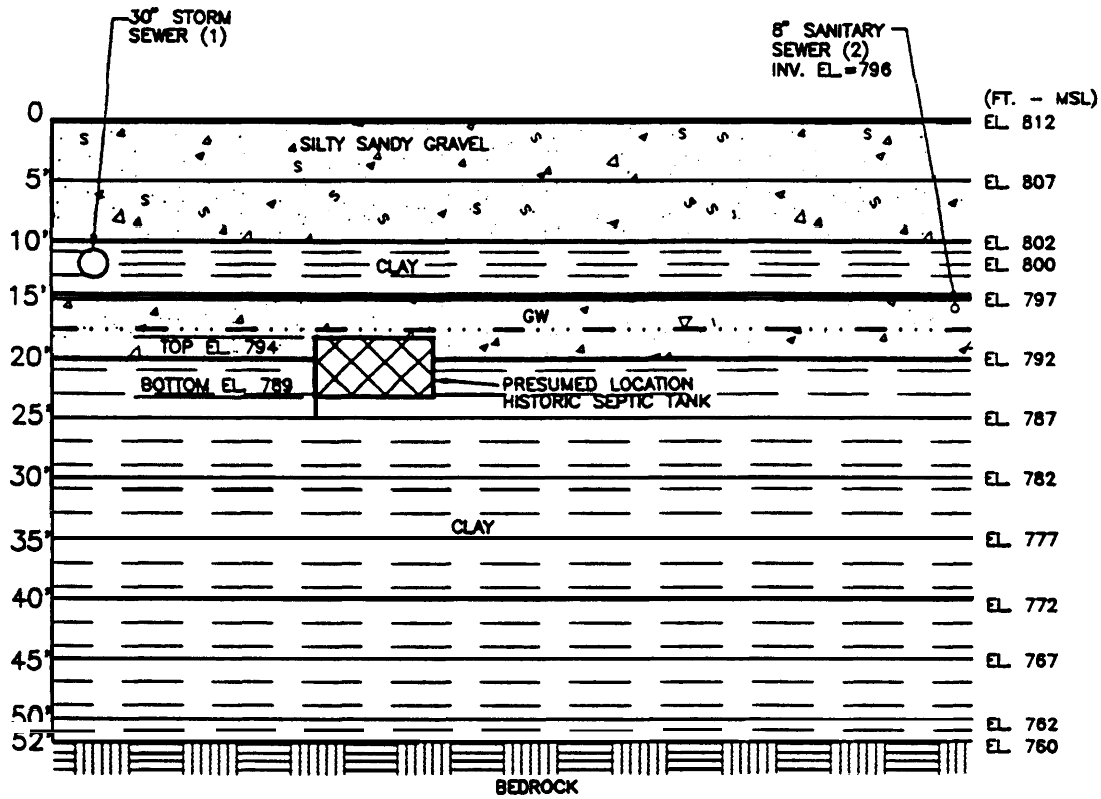
The septic tank is reported to have been installed at or near the surface of the original ravine in the late 1940's. The tank is assumed to be a 1,500 to 2,000 gallon concrete tank with nominal dimensions of 5 ft x 5 ft x 10 ft. Based on existing contours, the top of the tank is expected to be about 18 feet BGS and the base of the tank about 23 feet BGS.

Assumption.

2.3. **PROBLEM STATEMENT**

The problem, as defined by this removal action, is the presence of soils contaminated with actinium-227, thorium-228/232 and radium-226 above clean-up levels within a pre-determined volume in the northern portion of Area 7. The potential release of this contamination to area groundwater constitutes a threat to both on-site workers and possibly the off-site environment.

The site problem defined on the basis of the conceptual model and expected conditions.



NOTES:

(1) 30" STORM SEWER CONSTRUCTED OF REINFORCED CONCRETE PIPE (RCP).

(2) 8" SANITARY SEWER CONSTRUCTED OF VITRIFIED CLAY PIPE (VCP).

(3) IDEALIZED STRATIGRAPHY BASED ON B-3 AND B-16 BORING LOGS.

HORIZONTAL DISTANCE NOT TO SCALE

25 OCTOBER 1994

FILE NO.: 7102 EGGXB.DW

Figure 2.2. Conceptual Site Stratigraphy

OU5, Area 7 Removal Action Work Plan
October 1994

<u>Note B</u>. **<u>Action Memorandum for a Time-Critical Removal Action at Idaho National Engineering Laboratory</u>.**

The following Action Memorandum provides an example of the extent to which a decision document can be focused for a time-critical removal action. This removal action was initiated at INEL to remove sludge from a former chemical processing plant. The action memorandum was issued and the action has since been completed.

Elements of this action are:

- The majority of the design and actual implementation information has been left to other documents (e.g., removal/action work plan, field procedures). This allows the action memorandum to be brief and focused on the specific site problem and resolution that has been determined.

- The action memorandum is consistent with EPA's suggested outline (EPA, 1990) for non-time-critical removal actions.

- The action memorandum, while issued by DOE as the lead agency, received regulatory consensus prior to its issuance.

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DEPARTMENT OF ENERGY
IDAHO FIELD OPERATIONS OFFICE
LEAD AGENCY ACTION MEMORANDUM
REMOVAL ACTION - IDAHO CHEMICAL PROCESSING PLANT

SUBJECT: Action Memorandum for a Removal Action at the Idaho Chemical Processing Plant, Waste Area Group 3, Operable Unit No. 9, CPP-740 Settling Basin, Idaho National Engineering Laboratory, Butte County, Idaho.

I. PURPOSE

The purpose of this action memorandum is to document approval of the proposed removal action described herein for Idaho Chemical Processing Plant (CPP)-740 settling basin site, Idaho National Engineering Laboratory, Butte County, Idaho.

II. **SITE CONDITIONS AND BACKGROUND**

This is a time-critical removal. The site consists of a concrete settling basin and tank containing some 2,700 gallons of sludge and approximately 4,600 gallons of water, both which are radioactively contaminated. The settling basin was constructed in 1962 and abandoned in 1977. Because of the site conditions, age of this facility and the liquid nature of the contamination, an action is warranted.

A. SITE DESCRIPTION

1. REMOVAL SITE EVALUATION

The site's key problem area includes a concrete settling basin constructed in 1962 containing some **2,700** gallons of sludge and 4,600 gallons of water, both of which are radioactively contaminated. (Radioactive waste characterization of CCPP-603 Basin System, CPP-740, Technical Report WM-Fl-81-023, Revision 1.)

Both a preliminary assessment and site inspection were completed as part of a Value Engineering Session held March 15-16, 1993. Because of the age of the structures (1962 construction period), there is a potential threat of release to the environment of this radioactively contaminated media.

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Expected conditions.

Removal Site Evaluation is integrated into the Action Memorandum.

Site problem identified.

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2. PHYSICAL LOCATION The CPP began operations in 1953 as a facility for receipt, interim storage, and reprocessing of nuclear materials, such as irradiated nuclear fuel from test, defense, and research reactors in the United States and other countries. The plant is located at the Idaho National Engineering Laboratory (INEL), about 45 miles west of Idaho Falls, Idaho. There are no residents within an 11-mile radius of the site and a very low density within a 32-mile radius. 3. **SITE CHARACTERISTICS** The Fuel Receiving and Storage Facility (CPP-603) is located at the south end of the CPP. Prior to reprocessing, spent fuel assemblies are stored at the basin area until a sufficient amount of fuel is accumulated for a reprocessing run. The basins are filled with water with approximately 20 ft of cover of the fuel assemblies to provide radiation shielding. With the construction of this facility, a filtration system was installed to maintain the visibility of the water. This system consisted of a diatomaceous earth filter. The filter was back washed periodically when a pressure drop occurred. The backwash slurry of filter aid material and backwash water was then pumped to CPP-301, a vertical concrete settling basin. When the slurry settled, the supernatant was then drained from the settling pit to a dry well. The settling period usually required the slurry to settle overnight, hence holding up back washing. It was for this reason that in 1962 the horizontal settling basin (CPP-740) was constructed. The use of the CPP-740 settling facilities was terminated in early 1977 when a system of pressurized solid filter replaced this system. This site is owned by the federal government. This is the first removal action at this site, but one of three sites planned for a removal action at WAG 3.	**Process information.**

4. RELEASE OR THREATENED RELEASE INTO THE ENVIRONMENT OF A HAZARDOUS SUBSTANCE, OR POLLUTANT OR CONTAMINANT

Because of the age of this settling facility and the liquid nature of the contamination this facility poses a threat of release to the environment, including soils.

Basis for using removal action/CERCLA 104 Authority to respond to site problem.

The materials known to be on-site consist of radioactively contaminated liquid and sludge and include Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances under CERCLA Section 101(14).

Total volume of hazardous substances is estimated to be 2,700 gallons of radioactively contaminated sludge and 4,600 gallons of radioactively contaminated liquid.

5. **NATIONAL PRIORITIES LIST (NPL) SITE STATUS**

The Idaho Chemical Processing Plant is a Waste Area Group (WAG 3) and is located within the boundaries of the designated INEL NPL site. No remedial activities are in progress at the CPP. No remedial actions are proposed at this time.

6. **LOCATION MAPS**

Figure 1-1 shows the location of the site with respect to the INEL. Figure 1-2 shows the site location with respect to southeastern Idaho. Figure 1-3 shows the location of the horizontal settling basin (CPP-704) and its location relative to the Fuel Receiving and Storage Facility (CPP-603).

B. OTHER ACTIONS TO DATE

There are no actions to date by the U.S. Department of Energy-Idaho Field Operations (DOE-ID) on this site. No current remedial actions are under way on this site.

C. STATE AND LOCAL AUTHORITIES' ROLE

The Idaho Department of Health and Welfare has been notified of actions at this site. The DOE-ID will be the lead agency for this removal action.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Conditions presently exist at the site which, if not addressed by implementing the response action plan, may present a substantial endangerment to the environment. Conditions at the site meet the criteria for a removal action as stated in the National Contingency Plan (NCP), 40 CFR Section 300.415:

Listing of specific reasons this response meets criteria listed in NCP for using removal (CERCLA 104) authority.

A. THREATS TO THE ENVIRONMENT

1. Hazardous substances or pollutants or contaminants in drums. barrels, tanks or other bulk storage containers that may pose a threat of release, 40 CFR 300.415 (b) (2) (iii) – The settling basin was constructed in 1962 and its present physical condition is not known, however, given the age of the facility and the liquid nature of the radioactive contamination, action needs to be taken to prevent threat of a release to the environment.

2. Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released, 40 CFR 300.415 (b) (2) (v) – The top of the settling basin is not sealed and precipitation or run off from other sources could enter the basin, causing an overflow of subsequent contamination of soils.

IV. ENDANGERMENT ASSESSMENT

Threatened release of hazardous substances from this site, if not addressed by implementing the response action selected in this memorandum, may present an endangerment to the environment.

Required endangerment assessment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

The proposed removal action consists of on-site pumping of the sludge and the liquid, solidification of the sludge and off-site disposal at the Radioactive Waste Management Complex (RWMC). The RWMC facility, located several miles west of the ICPP, receives

Removal action approach.

low level radioactive waste for storage. Radioactive wastes are transferred and stored in approved containers and must meet acceptance criteria for LLW before being stored at this facility. The RWMC manages this waste to meet State and EPA requirements.

The radioactively contaminated liquid would be treated at the Process Equipment Waste (PEW) Facility. The PEW treats wastes containing radioactive constituents from various processes at the ICPP. Liquid wastes are evaporated to concentrate radioactive fractions which are then transferred to a permitted storage tank facility. These high level liquid wastes are then calcined at the Waste Calcine Facility to reduce their volume and mobility. This action was selected based on the following factors:

1. Pumping of the sludge and liquid is the most effective action to prevent and eliminate the threat of release to the environment.

2. A technology is available for the solidification of the radioactively contaminated waste.

3. On-site disposal at the RWMC, and the processing of the liquid at the PEW is readily available, requiring a minimum of handling and transport.

A. PROPOSED ACTION

Soil covering the settling basin, approximately 7 ft, will be excavated for access to the basin. The sludge and liquid will be removed and disposed of as discussed in Section V above.

1. CONTRIBUTION TO REMEDIAL PERFORMANCE

This removal action would contribute to the efficient performance of any long-term remedial action by: (1) addressing the threat of a release that requires attention to stabilize that site to protect the environment of a release of some 7,300 gallons of radioactively contaminated sludge and liquid until a long term-remedy can be implemented;
(2) preventing a potential of further migration to the environment of radioactively contaminated media; and (3) not hindering or foreclosing viable options for long-term remediation.

Relation to long-term actions at site.

2. DESCRIPTION OF ALTERNATIVE TECHNOLOGIES	
No other alternate technologies were considered given that the sludge can be solidified and disposed of at the RWMC, and the liquid waste can be handled on-site at the PEW.	**Focused alternative assessment.**
3. **ENGINEERING EVALUATION/COST ANALYSIS**	
This applies only to non-time critical responses. This is a time-critical response.	
4. **APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARAR)**	**ARARs assessment.**
FEDERAL ARAR'S	
Regulations under 10 CFR 61 would be "relevant and appropriate" for disposal at the RWMC.	
STATE ARAR'S	
No standards or regulations would be considered as ARAR's for this removal action. Calcining of the radioactive waste would fall under the requirements of the Idaho air regulations.	
5. **PROJECT SCHEDULE**	
Planning for this response action is currently under way, and it is expected that field activities will begin in July or August and be completed by mid-November 1993.	
B. **ESTIMATED COSTS**	
The estimated cost to accomplish the cleanup would be $1,100,000.	
IV. **EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN**	
Delayed action would increase the risk that a release of radioactively contaminated material would occur.	
VII. **OUTSTANDING POLICY ISSUES**	
None	

VIII. ENFORCEMENT

DOE/ID is conducting this response action under their authority as a "lead agency" under 40 CFR 300.5 and .415 (b) (l).

IX. RECOMMENDATION

This decision document represents the selected removal action for the CPP-740 Settling Basin site, in Butte County, Idaho, developed in accordance with CERCLA as amended, and not inconsistent with the NCP.

Conditions at this site meet the NCP Section 300.415 (b) (2) criteria for a removal; and this action was approved by DOE/ID on April 6, 1993 at a Baseline Change Proposal meeting on April 6, 1993 (see attached approved Baseline Change Proposal 93-22). The total project costs are estimated at $1,100,000. The funding for this project is being provided by DOE/ID.

Note B: Example Action Memorandum for a Time-Critical Removal Action at INEL (continued)

Vote C. Example Outline for an Action Memorandum: Time-Critical Removal Action.

I. **Purpose**

II. Site conditions and background
   A. Site description
      1. Removal site evaluation
      2. Physical location
      3. Site characteristics
      4. Release or threatened release into the environment of a hazardous substance, pollutant, or contaminant
      5. NPL status
      6. Maps, pictures, and other graphics representation
   B. Other actions
      1. Previous actions
      2. Current actions
      3. Consistency with final actions
   C. State and local authority roles
      1. State and local actions to date
      2. Potential for continued state/local response

III. Threats to public health or welfare or the environment, and statutory and regulatory authorities
   A. Threat to public health or welfare
   B. Threats to the environment

IV. Determination of endangerment

V. Proposed actions and estimated costs
   A. Proposed actions
      1. Proposed action description
      2. Contribution to remedial performance
      3. Description of alternative technologies
      4. ARARs
      5. Project schedule
   B. Estimated costs

VI. Expected change in the situation if action is delayed or not taken

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<u>Note D.</u> **<u>Example Outline of Removal Action Work Plan</u>.**

1. Introduction
   - 1.1 Purpose
   - 1.2 Work plan format
   - 1.3 Background
   - 1.4 Objectives
   - 1.5 Action Memorandum/Removal Site Evaluation

2. Conceptual model
   - 2.1 Available data
   - 2.2 Expected conditions
   - 2.3 Problem statement

3. Design basis
   - 3.1 Applicable or relevant and appropriate requirements
   - 3.2 Other standards and requirements
   - 3.3 Removal action guidelines
   - 3.4 Design methodology

4. Removal action activities
   - 4.1 Additional site characterization
   - 4.2 Mobilization
   - 4.3 Site preparation
   - 4.4 Implementation

5. Site closure demobilization
   - 5.1 Investigative derived material disposal
   - 5.2 Site restoration

6. Schedule

7. Cost estimate

8. Project organization

Appendices

- A Sampling and Analysis Plan (i.e., a Field Sampling Plan and Quality Assurance Project Plan)
- Health and Safety Plans (required under 29 CFR 1910.120 and 40 CFR 300. 150)
- A construction quality assurance plan
- Integration of activities with the facility Community Relations Plan
- Procedures for dealing with unexpected occurrences
- Progress reporting
- Demonstration of completion

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Note E. **Example Design Basis for a Time-Critical Removal Action at Mound.**

This removal action design basis provides an example of how to design an action to meet a set of expected site conditions, while acknowledging uncertainties and preparing to manage uncertainty in the field.

The Operable Unit (OU) 5, Area 7, Actinium-Contaminated Soil Removal Action Work Plan, from which this design basis has been extracted, provides the operating procedures for performing a time-critical removal action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for a portion of Area 7 within OU5 suspected of containing actinium-227 contaminated soils in and around a buried septic tank.

Area 7 is located in the northern portion of Mound OU 5 in the vicinity of buildings 29, 51, 66, and 98, and is approximately 700 ft by 200 ft in size. Originally a steep ravine, Area 7 historically received backfill material and debris. A septic tank, installed in the northern end of Area 7 during the construction of the Mound site in the late 1940s, was abandoned at the time site operations began. In 1959 or 1960, soil, concrete, and gravel contaminated with actinium-227, radium-226, and thorium-232 from the SW building were buried in and/or near the abandoned septic tank. Subsequently, the area in the vicinity of the tank was backfilled to level the ravine. In 1984, a parking lot was built over the backfill adjacent to Buildings 29 and 98.

This work plan was based on detailed discussions with EG&G Mound Environmental Restoration (ER) and Decontamination and Decommissioning (D&D) personnel. A conceptual model was prepared detailing the conditions expected to be encountered at the site, including nature, location, and extent of contamination. The work plan strategy, developed using the Streamlined Approach For Environmental Restoration (SAFER), provides contingency plans in the event that actual site conditions vary from the expected site conditions. A design basis was established for excavation, temporary storage, waste management, and disposal of contaminated soils for the removal action in Area 7.

3. DESIGN BASIS

This section includes information necessary to serve as a basis of design for the removal action. Specifically, this section presents regulations that are considered practicable for a removal action, Mound and DOE policies and procedures, removal action guidelines, the design methodology, and the design flow diagrams. Each of these items is addressed in the following sub-sections.

3.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Mound OU5 applicable or relevant and appropriate requirements (ARARs) for the ER Program Remedial Investigation/Feasibility Study (RI/FS) project have been identified (DOE, 1993b). CERCLA regulations require that removal actions comply with ARARs only to the extent practicable.

ARARs **are a part of the design basis: they may provide necessary performance requirements or specifications.**

Only those ARARs that relate to the actual removal action and not to long-term remediation, apply to the removal. The following ARARs are federal and state requirements that are considered practicable for this removal action.

3.1.1. Air Qualitv

- **§40** C.F.R. Part 61 Subpart H: National Emissions Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities.
- Ohio Administrative Code (0. A. C.) 3745- 15-07(A): Air Pollution Nuisances Prohibited
- O.A.C. 3745 -17-02(A,B,C): Particulate Ambient Air Quality Standards
- O.A.C. 3745-17-05: Particulate Non-Degradation Policy
- O.A.C. 3745-17-08 (A)(l), (A)(2), (B), (D): Emission Restrictions for Fugitive Dust

3.1.2. Worker Safetv

- §29 C.F.R. Part 1910: Occupational Safety and Health Act (OSHA) –General Industry Standards
- §29 C.F.R. Part 1926: OSHA–Safety and Health Standards

- §29 C.F.R. Part 1904: OSHA –Recordkeeping, Reporting, and Related Regulations

3.2 **OTHER STANDARDS AND REQUIREMENTS**

The following is a list of other standards and requirements applicable to this removal action.

3.2.1 **Mound Manuals and Procedures**

Internal facility requirements contribute to design basis.

Mound manuals and procedures applicable to this removal action include:

- Quality Policy and Responsibilities (MD-10334)
- Quality Assurance Program for Engineering Dept. (MD-10241)
- Standards and Calibration System (MD- 1OO96)
- Safety and Hygiene Manual (MD-10286)
- Radiological Protection Program Manual (MD-1OO19)
- D&D Field Coordinator Manual (MD-10167)
- Low-level Waste Management Manual (MD-81240)
- General Procedures for Calibration of Radiation Protection Instrumentation (MD-10215)
- Waste Certification Program Plan (MD-8102O)
- D&D Decontamination Procedures (MD-10332)
- Form ML-7588 Engineering Review Transmittal Sheet

  Form ML-8440 Project Quality Assurance Review

  Form ML-8816 Engineering Department Non Conformance Report
- Health Physics Procedures (MD-80036)

- Work Package Development Manual, Decontamination and Decommissioning – Mound, 1992
- Quality Assurance Plan for Decontamination and Decommissioning Project Management (MD-10241)
- Debris Disposal (WS12)
- Environmental Restoration Procedures (OU9 RI/FS QAPjP)

3.2.2. **DOE Orders/Criteria**

The following list of DOE Orders and criteria are applicable to this removal action:

DOE orders contribute performance requirements or specifications to design basis.

- Radiation Protection for the Public and the Environment (5400.5)
- Radioactive Waste Management (5820.2A)
- Project Management System (4700.1)
- Radiation Protection for Workers (5480.11)
- Nevada Test Site (NTS) Waste Acceptance Criteria (NVO-325)

3.3. REMOVAL ACTION GUIDELINES

3.3.1. Actinium

There is currently no EPA clean-up standard for actinium-contaminated soil. Although no baseline risk assessments have been completed for OU5, Area 7 at this time, a risk analysis has been performed for actinium-contaminated soils at another location at Mound. For that project, the clean-up standard for actinium-227 was based on a risk model incorporating a residual radioactive material program (RESRAD) that took into account sources, release mechanisms, exposure pathways, and receptors. For that analysis, the following model assumptions were made:

Precedent for cleanup level for actinium. The cleanup level becomes a performance requirement in the design basis.

- Pathways: external radiation, dust inhalation, groundwater ingestion, soil ingestion, and radon.

- Exposure parameters: 30-yr. exposure, 2,000 hrs./yr. on-site, 80% thereof indoors, 20% thereof outdoors.

- Fraction of drinking water from on-site groundwater = 0.23.

Based on these assumptions, a concentration of 5 pCi/g of actinium-227 resulted in a dose of less than 10 mrem and a corresponding lifetime cancer risk of 2.5 x 10^{-5} Pending further assessments, this concentration will be used as the actinium-227 clean-up goal for this removal action.

3.3.2. <u>Thorium and Radium</u>

Per DOE Order 5400.5, the clean up criteria for thorium and radium are 5 pCi/g within 15 cm of the surface and 15 pCi/g at depths greater than 15 cm.

3.4. **DESIGN METHODOLOGY**

The removal action design is composed of three main tasks: excavation, temporary storage, and waste management/disposal. Included in the design methodology for each of these tasks is a description of the expected approach, an uncertainty analysis of the expected conditions and potential deviations, and the monitoring and sampling strategy.

Primary tasks.

The design methodology is a synthesis whereby the expected conditions and design assumptions are initially formed into an expected approach, which is basically a "nothing will go wrong" design strategy. The expected approach is then analyzed to determine all credible deviations from that approach. There is, however, some uncertainty associated with these expected conditions. Uncertainties are attributed primarily to the subsurface conditions not being completely characterized, lack of detailed records as to the location of the septic tank and the deposit of actinium-contaminated soil, and the impacts of changing weather conditions.

Discussion of how uncertainty is managed in this design.

Expected conditions.

To manage these uncertainties, an analysis is conducted to determine the extent to which uncertainties need to be included in the removal action design. The uncertainty analysis starts by listing the expected conditions (extracted from the conceptual model) that are anticipated to be encountered during the removal action. Potential deviations are identified for each expected condition. The type of monitoring or sampling required to confirm if the deviation exists is developed. Contingency plans are developed and presented for the potential deviations to provide guidance on options for redirecting the technical approach. An evaluation of the probability of the deviation occurring is conducted in order to rate the impact of the deviation.

Uncertainties.

Monitoring.

Contingency plans.

Along with the expected approach, the contingency plans for the potential deviations that have a medium or high probability of occurring are included in the removal action design as credible contingencies. Low probability deviations will only be included in the design as contingency plans to be invoked should the unexpected deviation occur.

Note that the deviations were evaluated for probability of occurrence and impact.

The final design is developed as a series of flow diagrams (Section 3.5) in which the expected conditions and all credible contingencies are included.

3.4.1. <u>Excavation</u>

The excavation task and work directly associated with the excavation approach will be performed within the control zone, as defined in the HSP. Features of the control zone include the excavation, box staging during loading, work trailer, contaminated equipment storage, asphalt and concrete debris and the decontamination area.

Presented in the following subsections is a description of the expected excavation approach, the excavation uncertainty analysis, and the resulting monitoring/sampling strategy.

3.4.1.1. Expected Approach

The excavation approach for the removal action is designed to center the excavation, using available information, in the area of the highest concentration of actinium-contaminated soil. It is assumed that the highest concentration of actinium is located in the vicinity of the buried septic tank. However, as previously discussed, the location of the tank can not be confirmed by available information. Elevated levels of actinium have been detected in the soil in an area close to the suspected septic tank location (Figure 2.1), Consequently, the excavation will be focused on this area of known contamination which, for purposes of this removal action, is assumed to be over a 20 ft x 20 ft area. The excavation will extend down to a maximum depth of 23 ft below ground surface (BGS) which corresponds to the expected depth of the septic tank.

Expected conditions.

The expected approach for the removal action excavation will include:

- installation of a dewatering system;
- removal of asphalt and concrete;
- sloped excavation to a depth of 6 feet;
- installation of shoring;

- excavation an additional 17 feet in a 20 ft x 20 ft area; and,

- backfilling.

A 58 ft by 48 ft area will be the footprint for excavation. This area is based on having a sufficient working elevation for the 20 ft x20ft excavation, plus a sloped excavation from the surface to the working elevation. The 58 ft x 48 ft area will have the shortest sides parallel to the 30 inch storm sewer and the 20 ft x 20 ft area will be centered over the pocket of actinium contamination. The asphalt, concrete and sod surfaces will be removed from an area extending slightly beyond the 58 ft by 48 ft boundary. The control zone shall also have a soil liner for temporary stockpile of excavated asphalt/concrete debris. It may be necessary to screen the soils for construction materials or any other debris that could damage the stockpile liner. A continuous berm will be constructed around the stockpile perimeter to prevent contact with surface runoff.

If the asphalt/concrete stockpile debris in the control zone is contaminated, it will be placed in LSA boxes. To comply with off-site disposal criteria, the contaminated asphalt/concrete shall only be placed in the bottom (lower 6 inches) of the LSA boxes. The upper portion of the LSA boxes may be used for excavated soil. Consequently, several boxes may be required to remove all contaminated asphalt/concrete debris. Uncontaminated asphalt/concrete will be transferred to the Mound Spoils Area.

For the first six feet of excavation (approximately 450 cu yd), the soil removal will progress with side slopes (horizontal: vertical) of 1.5: 1 to provide a bench for equipment to excavate the remaining 17 feet. A 20 ft by 20 ft area will be marked off at the toe to the north slope leaving a 10 foot bench on the east, west and south sides. This area will be excavated vertically to a depth of 17 feet (approximately 250 cu yd) to remove the localized pocket of actinium contamination. Sheet piling with cross braces will be designed and installed to support the excavation. Figures 3.1. and 3.2. show the site plan for the proposed excavation and a profile of the excavation with the overall shoring support concept. Until the final excavation support design has been completed, the excavation design in this work plan is subject to change, to be consistent with the shoring design.

The project work will in all cases comply with OSHA requirements in general and will comply with OSHA excavation requirements (29 CFR1926.652) in particular including required sloping and shoring techniques. For the oil conditions expected, the project area has been classed as “C”, which allows a maximum unsupported slope of 1.5:1.

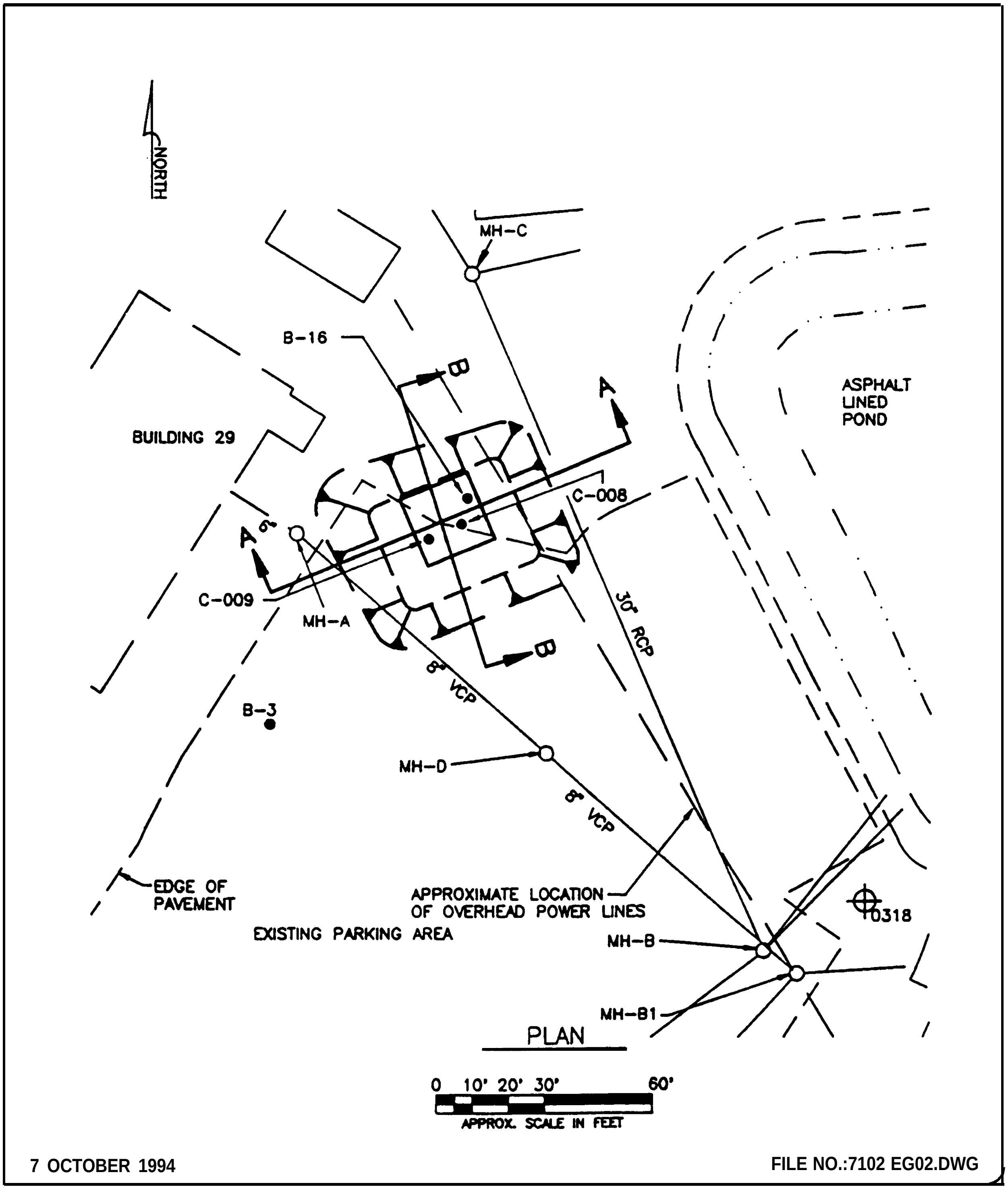

Figure 3.1. Excavation Site Plan

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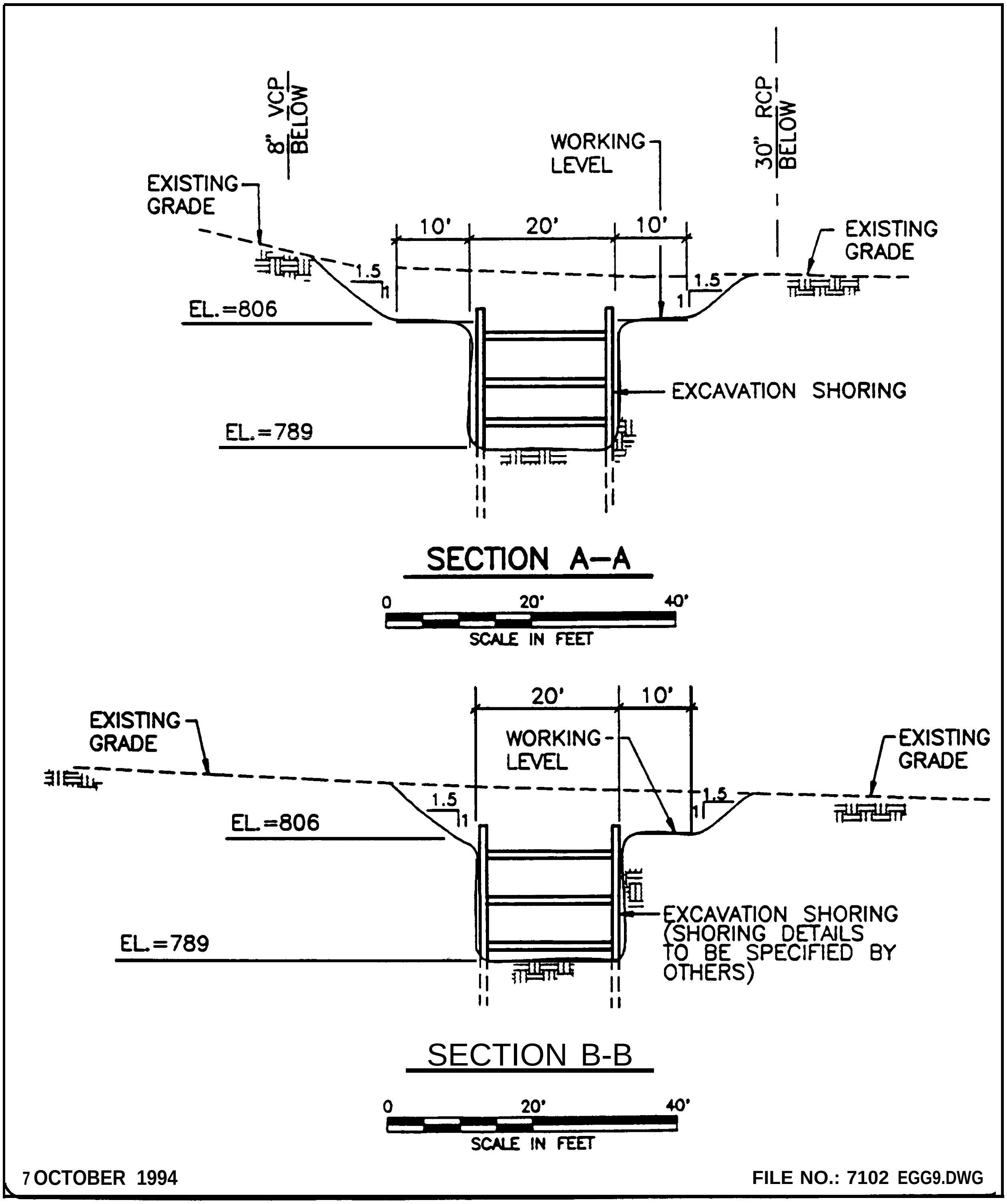

Figure 3.2. Profile of Excavation Shoring

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The dewatering system will be installed and activated prior to the excavation activities. Groundwater is expected to be encountered at 17 ft BGS and dewatering is required to lower the groundwater table to at least 23 ft BGS. Total dewatering flow is expected to be a maximum of 15 gpm or 20,000 gpd. Dewatering will be accomplished by a well point system designed by a Specialty Contractor. Excavated groundwater will be pumped to the asphalt lined pond. Figure 3.3 presents a conceptual layout of the dewatering system.	
3.4.1.2. **Uncertainty Analysis**	
Table III. 1 presents the uncertainty analysis for the excavation portion of the removal action.	**Uncertainties and possible deviations.**
The following are the six potential deviations that have a medium or high probability of occurring. Contingency plans for these potential deviations are included in Table III. 1 and are incorporated into the excavation design approach. • Contamination is widely dispersed in the subsoil. • The septic tank will be located in the excavation. • Groundwater will be encountered in the excavation. • Surface water will enter the excavation. • Saturated soil will be encountered. • Unknown utilities will be uncovered by the excavation.	
It is expected that the actinium-contaminated soil is confined to a relatively small volume located within the proposed excavation zone. Historical information documents the potential migration of contamination from the source. Also, the area has not been fully characterized. Thus, there is the likelihood that the contamination is not concentrated at the source. If this is the case, a contingency plan is needed after the excavation of the 20 ft x 20 ft x 17 ft target volume of soil is completed.	Deviation.
Field instruments will be used to scan each bucket per the radiation work permit (RWP), to determine if elevated radiological contamination is present at the excavation walls.	Monitoring.
If the contamination is still present above clean-up levels, the contingency plan is for DOE to decide if the removal action is to be expanded.	**Contingency plan.**
It is assumed that the septic tank will not be uncovered during the excavation to a depth of 23 feet BGS. Based on the GPR results and	Deviation.

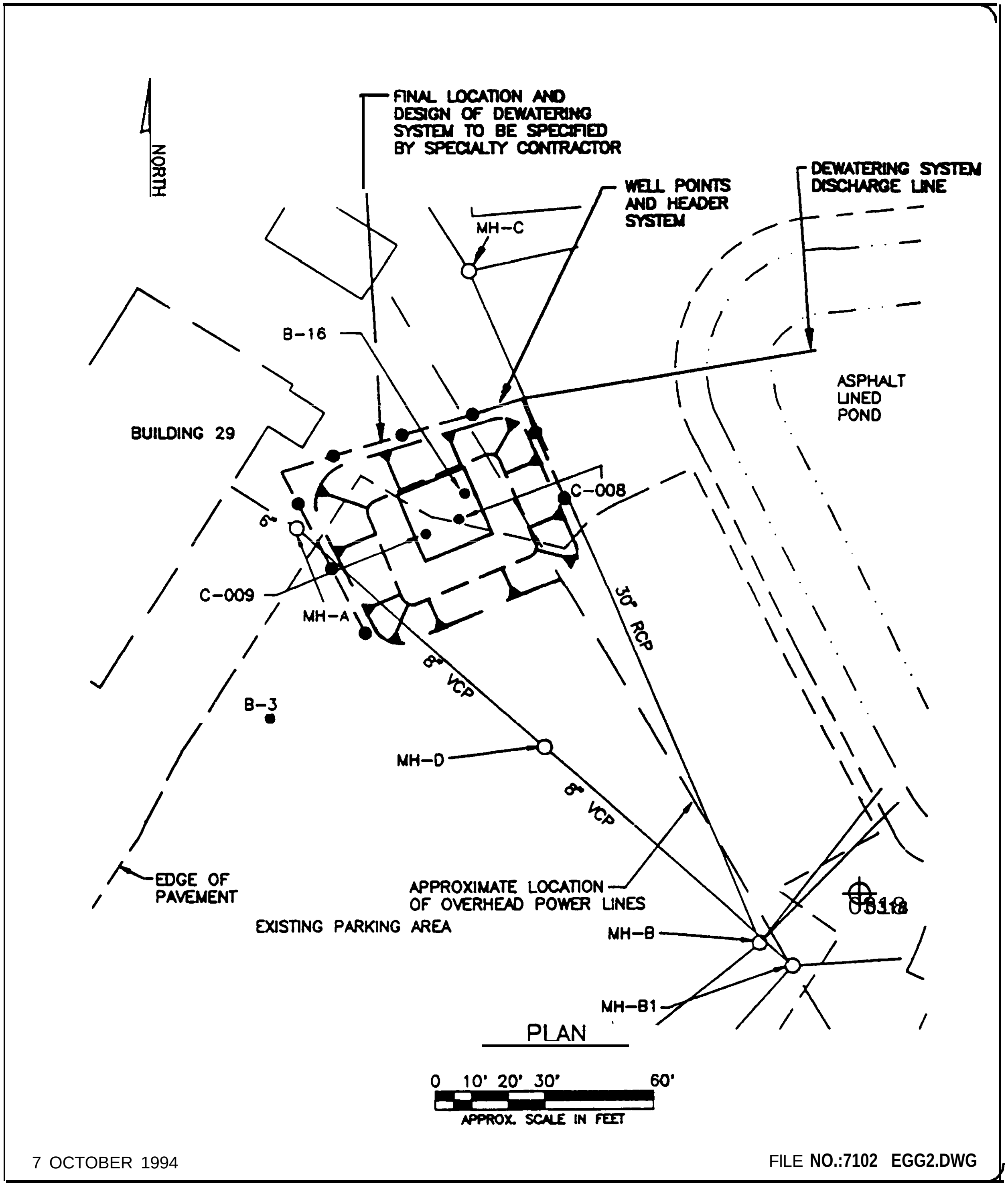

Figure 3.3. Conceptual Layout of Excavation Dewatering System

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Table III.1. Excavation Uncertainty Analysis
Page 1 of 2

Expected Conditions	Potential Deviations	Monitoring	Contingency Plan	Evaluation
Contamination is concentrated in a relatively small volume, rather than generally dispersed. Horizontal location is uncertain, but the majority of the contamination is assumed to lie within a volume 20 ft x 20 ft x 17 ft at a depth up to 23 ft BGS.	Contamination is widely dispersed. Most of the contamination, or the contamination source, is located outside of the selected 20 ft x 20 ft x 17 ft volume.	Using field instruments per RWP, monitor buckets for elevated rad concentrations at excavation face or at the bottom of the excavation. Contamination confirmed by field monitoring and lab analysis. Compare to clean-up goals.	DOE can decide whether or not to expand removal action scope. As defined, this removal action objective is to remove actinium contaminated soil within the 20 ft x 20 ft x 17 ft volume.	Medium probability; contingency plan included in design.
No hazardous wastes will be encountered.	Mercury and/or lead are encountered.	Preliminary analysis of B-16 soil and groundwater samples indicates no significant levels of VOCs, SVOCs, metals, rads. Field instruments (per RWP) will monitor for VOCs and SVOCs.	HSP/FSP have contingency plans for worker H&S.	Low probability; include monitoring deviation in design.
Septic tank not located at 18 ft to 23 ft BGS within excavation.	Tank found within excavation.	Visual (Mound Field Coordinator).	Excavate and remove tank.	Medium probability; included in design.
Soil is Class C (fill).	Soil not Class C.	Visual. No monitoring plan.	Class C is conservative assumption. No change in approach required.	Low probability; not included in design.
Groundwater will not be encountered because dewatering will work.	Groundwater will be encountered.	Visual (Mound Field Coordinator).	Excavate only to groundwater level.	Medium probability; included in design.
No significant rainfall events (greater than 1 inch/day) will occur during the excavation.	Significant rainfall will cause standing water in excavation.	Visual (Mound Field Coordinator).	Pump water into portable storage tanks. Pumps and containers to be available on-site.	Medium probability; included in design.
Saturated contaminated soil will not be encountered.	Saturated soil will be encountered.	Visual (Mound Field Coordinator).	-Stockpile soil on slope of excavation to dry. -D&D decision to add absorbent material to LSA box, per MD-10332. -Decision to not excavate into water.	Medium probability; will be included in design. Absorbent material to be available on-site.

Table III. . Excavation Uncertainty Analysis
Page 2 of 2

Expected Conditions	Potential Deviations	Monitoring	Contingency Plan	Evaluation
The storm and sanitary sewers will not be impacted by the excavation because the excavation will be shored and will not be close enough to the sewers to affect them. No other utilities will be encountered.	Storm sewer and/or sanitary sewer will be impacted by excavation.	-Visual (Mound Field Coordinator). -Monitor shoring system.	-Reroute or repair utility. -Evaluate impact of ground deflection.	Low probability; shoring included in design. Monitoring of ground deflection will be included in design.
	Other utilities will be	Utility survey prior o excavation.	-If abandoned - remove; -If active - reroute	Medium probability; included in design.
Excavation depths of 19.5 ft are possible with the available trackhoe.	Excavation to 19.5 ft not possible.	Visual (Mound Field	-Excavate to maximum possible depth. -Install bench to compensate. Design requires 17 ft. (max). -Use alternate excavation equipment.	Low probability; not included in design.
Building 29 utilities (electric, water, and compressed air) can support the removal.	During excavation, sufficient Building 29 utilities are not available, or need increases above expected.	Tripped circuit breakers, low pressure, etc.	-Obtain utility service from other buildings (pre-approval/D&D). -Provide portable sources.	Low probability; not included in design.

radiological results from soil borings C-008, C-009, and B-16, there is a medium probability that the septic tank will be discovered. If the tank is uncovered, the contingency plan is to remove the tank contents, demolish the tank, remove the tank sections from the excavation, and dispose of the material as low specific activity (LSA) waste.	**Monitoring.** **Contingency plan.**
A contingency plan will be needed if groundwater is encountered during the excavation. The expected condition is the groundwater dewatering system will be effective in keeping the excavation dry. There is, however, very little information on the characteristics of the aquifer. If the dewatering system is not effective in keeping the excavation dry, the contingency plan is to stop the excavation at the groundwater table.	**Expected condition.** **Uncertainty.** **Contingency plan.**
In addition to groundwater, water can accumulate in the excavation from rainfall. The expected condition is that there will not be rainfall of sufficient intensity or duration to result in rainwater accumulating in the excavation. If significant rainfall event occurs during the excavation activities, the contingency plan will be to pump the water to portable containers,	**Uncertainty.** **Contingency plan.**
Saturated soil may be encountered during the excavation. There is a relatively strong probability of this deviation occurring because the clay soils may contain a high moisture content that cannot be reduced by well point dewatering. Excavated saturated soil will be placed on the slope or bench of the excavation and allowed to dry. The Mound Field Coordinator will visually determine when the stockpiled soil is sufficiently dry to be loaded into LSA boxes. Moisture absorbent material will be added to the LSA boxes as necessary per Mound MD-10332.	**Uncertainty.** **Contingency plan.** **Monitoring.**
The final deviation to the excavation approach that is included in the design is the potential for encountering unknown buried utilities during the excavation. Additional underground utilities are suspected in the area of the excavation, and have a medium probability of occurrence based on interviews with Mound Plant workers. Although the surface will be examined for buried utilities prior to excavation, if unknown utilities are uncovered and found to be abandoned, the contingency plan is to remove the utility following Mound procedures. If the utility is active, the line will be rerouted around the excavation area.	
3.4.1.3. Monitoring	
The monitoring and sampling strategy selected for the expected excavation approach will focus on the activities related to the progression of the excavation. Specific monitoring activities include, but are not necessarily limited to the following:	**Monitoring plans for defining deviations.**

• Monitor concrete and asphalt for radioactive contamination as it is removed. • Monitor each bucket of excavated soil for organic vapors and radioactive contamination. • Visually monitor the excavation for evidence of buried waste (e.g., crushed containers, potentially contaminated equipment, discolored soil). • Visually monitor the excavation for saturated soil or standing water. • Visually monitor the excavated area for unknown buried utilities. 3.4.2. Temporay Storage The purpose of temporary storage is to support the removal action effort by providing an adequate and secure staging area for the soil and groundwater during their evaluation prior to final disposition. The temporary storage expected approach, as described in the following sections, is based on the materials that require handling from the excavation. Ideally, the type and concentration of soil contamination should be determined at the time of placement into the boxes. However, due to the time required to ascertain whether the soil is contaminated or not (i.e., to the level of precision required by the clean-up standards), a staging concept has been selected to permit the excavation process to proceed unimpeded by the sampling and analysis timing requirements. 3.4.2.1. Expected Approach The removal action expected approach requires temporary storage of • empty LSA boxes, empty water storage tanks; • excavated soil/septic tank debris in boxes; • groundwater; • surface water runoff; and • decontamination rinsate The temporary storage area shall have areas designated for empty LSA boxes, filled LSA boxes, equipment storage, and water storage tanks (see Figure 3.4). The area shall have sufficient aisle clearance for trucks and fork lifts to maneuver.	 **Expected conditions.**

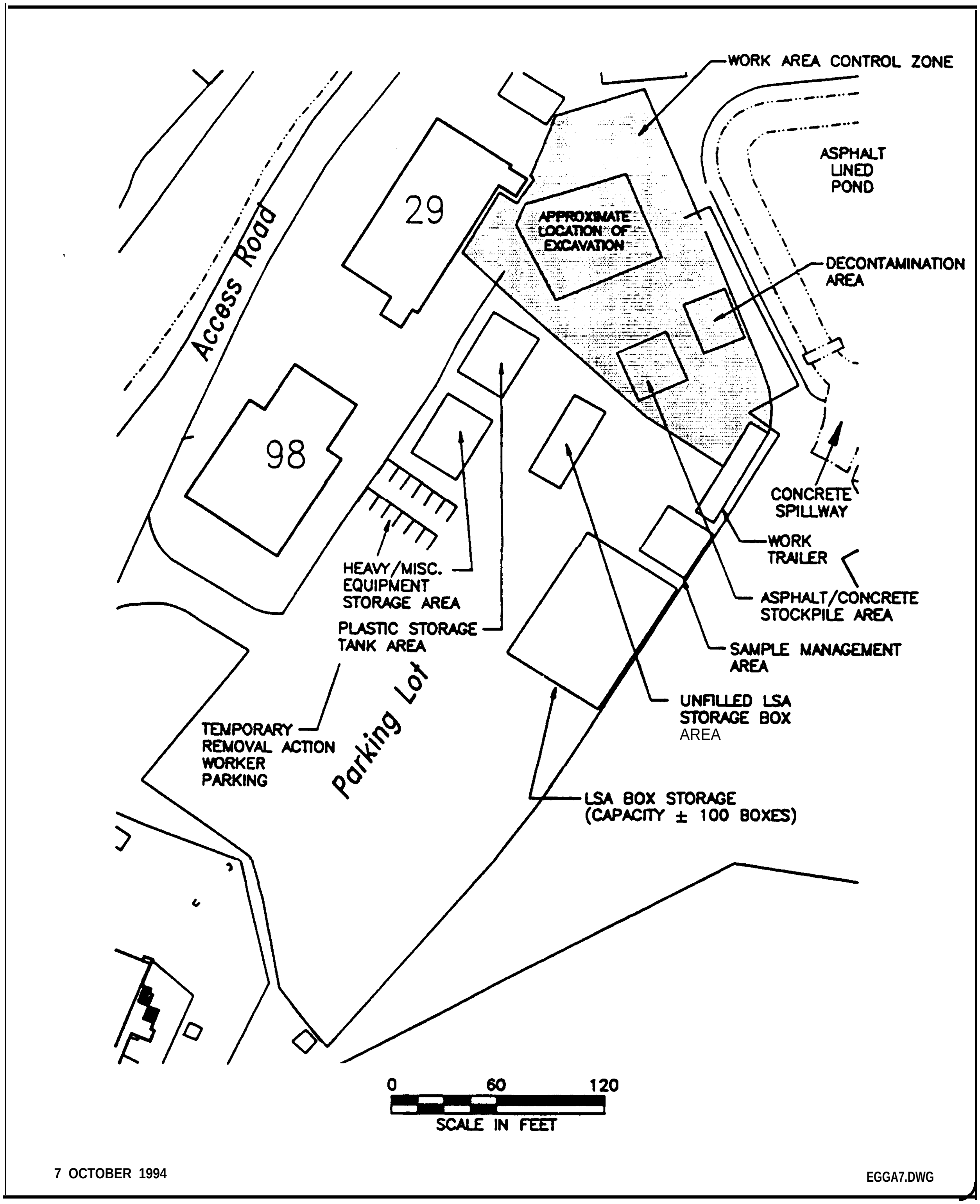

Figure 3.4. Area 7 Temporary Storage

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LSA-type storage containers (B-25 boxes) sufficient to store excavated soil will be available. As soon as each box is filled (2-3 cu yd of excavated soil), the box will be moved from the excavation site to a designated staging area in the Area 7 parking lot, located to the southeast of the excavation site, as shown in Figure 3.4. Each box will have five sample cores taken (one from each corner plus one from the center) and composite into a single sample for analysis at the Mound Soil Screening facility (radioactive analysis) and the Mound Analytical laboratory (gamma-spectrum analysis) See (FSP, Appendix C). After each box has been sampled, it will be sealed and secured, in accordance with Mound procedure MD-10332.

Groundwater removed by the excavation dewatering system will be transferred and temporarily stored in the adjacent asphalt-lined pond. The pond provides controlled discharge through a drainage ditch into an on-site retention pond, prior to release off-site. Since the groundwater is expected to be uncontaminated, it will not require treatment prior to discharge. The capacity of the pond is approximately 1.5 million gallons, which exceeds the maximum projected groundwater volume. The dewatering system discharge will be monitored for contamination.

If surface water flows onto the site, it will be collected and pumped into plastic storage tanks located adjacent to the excavation area, in the Area 7 parking lot. Similarly, any decontamination rinsate will be transferred to the storage tanks. Samples of water will be taken from the storage tanks and analyzed at the Mound laboratory for radioactive contamination, pending further treatment and/or disposal.

Clean backfill (CERCLA requirements) will be required from off-site sources. When backfilling activities begin, the backfill will be transferred directly to the site by truck and placed in lifts into the excavation. Consequently, it is not expected to require temporary storage.

3.4.2.2 Uncertainty Analysis

The conditions expected to impact temporary storage activities are shown in an uncertainty analysis (Table III.2). As a result of this analysis, the expected temporary staging approach was modified to include the following contingencies:

Uncertainties, evaluation, contingency plans for temporary storage.

- contaminated groundwater; and
- non-WS12 criteria debris (Mound Plant criteria for debris).

If contaminated groundwater is detected by the dewatering system monitors, the dewatering process will be discontinued and the

Table III.2. Temporary Storage Uncertainty Analysis

Expected Conditions	Potential Deviations	Monitoring	Contingency Plan	Evaluation
Groundwater contamination will not be encountered above the asphalt-lined pond (NPDES) permit release limits.	Groundwater contamination is encountered above NPDES limit.	-Pond 24-hour composite sample analysis test for constituents required per NPDES limit. -Groundwater discharge monitored for rads and VOCs.	-Discontinue dewatering. -Excavation will not extend below groundwater table.	Low probability; include contingency plan in design.
The asphalt-lined pond has sufficient capacity for storage of pumped groundwater.	Groundwater discharge from dewatering system exceeds asphalt-lined pond capacity.	Monitor pond level during dewatering (Mound Field Coordinator).	-Pond capacity (1.5 Mgal) greater than expected groundwater volume. -Do not excavate below groundwater elevation. -Decrease dewatering rate	Low probability; include monitoring for deviation in design.
Sufficient LSA boxes are available for storage of all excavated soil.	Volume of excavated soil exceeds available supply of LSA boxes.	Visual (Mound Field Coordinator).	-Stop excavation. -Procure additional boxes.	Low probability; not include in design.
Clean backfill will be available as needed from offsite.	Clean backfill requires temporary staging.	NA	Provide temporary staging area.	Low probability; not included in design
Excavated soil complies with Mound WS12 criteria.	Soil contains debris that does not comply with WS12.	Visual (Mound Field Coordinator) per Mound HP procedures manual (WS12 criteria).	Segregate debris and store in debris LSA box.	Low probability; include contingency plan in design.

excavation will not be permitted to extend below the groundwater table. Contaminated groundwater will not be temporarily stored in the staging area. If the runoff water in the asphalt lined pond exceeds the NPDES discharge limits, the water will be pumped into a tanker truck and either transferred to WD Building for treatment and processing, or transferred elsewhere on Mound site for solidification and off-site disposal.

If any debris is encountered during the excavation process that does not meet Mound's WS 12 criteria, it will be placed into LSA boxes identified for debris, and transferred to the staging area, pending disposal.

3.4.2.3. Monitoring/Sampling

Based on the expected approach (as modified by the uncertainly analysis), the temporary storage monitoring and sampling strategy includes, but is not limited to, the following.

Monitoring for deviations related to temporary storage.

- Sample staged LSA boxes for Mound laboratory analysis, per FSP (Appendix C)
- Visually monitor pond water level during dewatering activities, to determine rate of increase.
- Monitor groundwater discharge for radioactive and chemical contamination, per FSP.
- Monitor pond (24-hr composite sample) to determine if excavated groundwater exceeds NPDES discharge limits.
- Monitor LSA box inventory to assure adequate supply .
- Monitor temporary staging area for evidence of leaking containers or storage tanks, deterioration, parking lot surface cracking, etc.
- Monitor WD Building treatment and storage capacity, if surface water runoff has been transferred to plastic storage tanks.

Swipe all equipment that has been decontaminated to confirm that levels of removable contamination meet Mound Health Physics (HP) requirements.

- Sample/analyze any surface water or decontamination rinsate from the excavation that was transferred to plastic storage tanks to determine if it can be treated in the WD Building.

3.4.3 <u>Waste Management/Disposal</u>

The waste management task encompasses the transfer of waste and materials from the removal action site to other locations that routinely manage/dispose of the wastes generated in removals. The expected waste management/disposal approach for this removal action is described in the following subsections in terms of the excavation and temporary storage needs.

3.4.3.1. Expected Approach

The removal action expected approach requires waste management/disposal of:

Expected waste management conditions.

- filled LSA boxes;
- construction debris on liners;
- surface water (plastic tanks);
- unused empty boxes, liners, plastic tanks;
- excavation equipment; and
- decontamination rinsate.

The soil in the LSA boxes will require staging until the Mound Field Coordinator decides it will be transferred to interim storage elsewhere at Mound, pending a decision for final disposal. The LSA boxes will remain at the Mound interim storage location pending authorization to ship boxes to an approved off-site disposal facility. Boxes will be sampled on a random basis in accordance with Mound Procedure MD-8 1240 for waste characterization before off-site disposal.

Construction debris (certified as clean per HP survey) will be shipped directly from the Area 7 parking lot staging area via truck to the Mound Spoils Area.

The surface water (if any) which has been stored in plastic tanks will be transferred by tanker trucks to the Mound WD Building for treatment and disposal.

Any unused and empty LSA boxes, stockpile plastic liners, and plastic tanks will be decontaminated as necessary and transferred to storage for re-use in future ER projects. Excavation equipment and containers that were exposed or potentially exposed to contaminated soils or groundwater will be decontaminated and transferred to D&D for future use.

All decontamination rinsate stored in plastic tanks will be collected in tanker trucks and transferred to the Mound WD Building for treatment and disposal.

3.4.3.2. Uncertainly Analysis

The conditions expected to impact waste management/disposal activities are shown in an uncertainty analysis (Table III. 3). As a result of this analysis, the expected waste management/disposal approach was modified to include the following contingency plans:

Uncertainties, evaluation, and contingency plans related to waste management.

- Resource Conservation and Recovery Act (RCRA) waste;
- Transuranic (TRU) waste;
- contaminated asphalt/concrete;
- water WD Building cannot process; and
- non-WS 12 criteria debris.

RCRA waste boxes will be transferred to a RCRA disposal facility or to Mound interim RCRA storage, pending final disposition. Mixed waste (RCRA and LSA) will be transferred to the Mound interim mixed waste storage facility, pending final disposition.

Based on results from the Mound Soil Screening facility, LSA boxes will be re-labeled as TRU waste and will be transferred to the Mound interim storage location, in a manner similar to LSA boxes (above). Contaminated asphalt/concrete waste will be disposed in the same manner as LSA boxes.

Water that WD Building cannot process will be transferred from temporary plastic storage tanks via tanker truck to another location at Mound for solidification, packaging, and disposal as LSA waste.

Non-WS 12 criteria debris will be disposed in the same manner as LSA boxes.

Table III.3. Waste Management and Disposal Uncertainty Analysis

Expected Conditions	Potential Deviations	Monitoring	Contingency Plan	Evaluation
No RCRA waste will be excavated.	RCRA wastes will be excavated.	Lab analysis of box samples for waste characterization.	-If rads are present, dispose as mixed waste; if no rads present, dispose in accordance with Mound procedures. -Perform additional lab analysis	Low probability; not included in design.
No transuranic contaminated soil will be excavated.	Transuranic soil will be encountered.	FIDLER and laboratory analysis. Compare to TRU criteria (NTS).	Change labelling on LSA boxes to TRU waste and store per Mound procedures pending disposal decision	Low probability; include contingency plan in design.
Asphalt and concrete are not contaminated.	Asphalt and concrete are contaminated.	Direct readings and swipes per Mound procedure MD-80036	Segregate materials and dispose in LSA boxes.	Low probability; include contingency plan in design
Storm water entering excavation will be pumped into plastic storage containers and shipped to WD building.	Storm water encountered that WD cannot process.	Laboratory analysis for rads. of samples collected from the storage tanks.	-Store onsite in plastic tanks pending disposal decision. -solidify and package as LSA waste	Low probability; include contingency plan in design.
Rad contamination encountered in excavated soils.	Some LSA boxes have clean soil.	Sample boxes for waste characterization at temporary storage.	Soil below offsite disposal limits requires other disposal (e.g., Mound Spoils Area or TBD).	Medium probability; resolution not included in design.

3.4.3.3. Monitoring/Sampling	
Based on the expected approach (as modified by the uncertainty analysis), the waste management/disposal monitoring and sampling strategy will be to sample/analyze LSA/TRU boxes at the Mound interim storage location as required to meet the waste acceptance criteria of the approved off-site disposal location.	Monitoring plans.
3.5. DESIGN FLOW DIAGRAM	
The expected approach, as modified by the results of the uncertainty analysis, and incorporating the monitoring and sampling requirements, is described in the flow diagram (Figure 3.5) for the sequence of work and excavation, temporary storage, and waste management/disposal approaches.	Graphic of design approach with monitoring decision points and contingencies.
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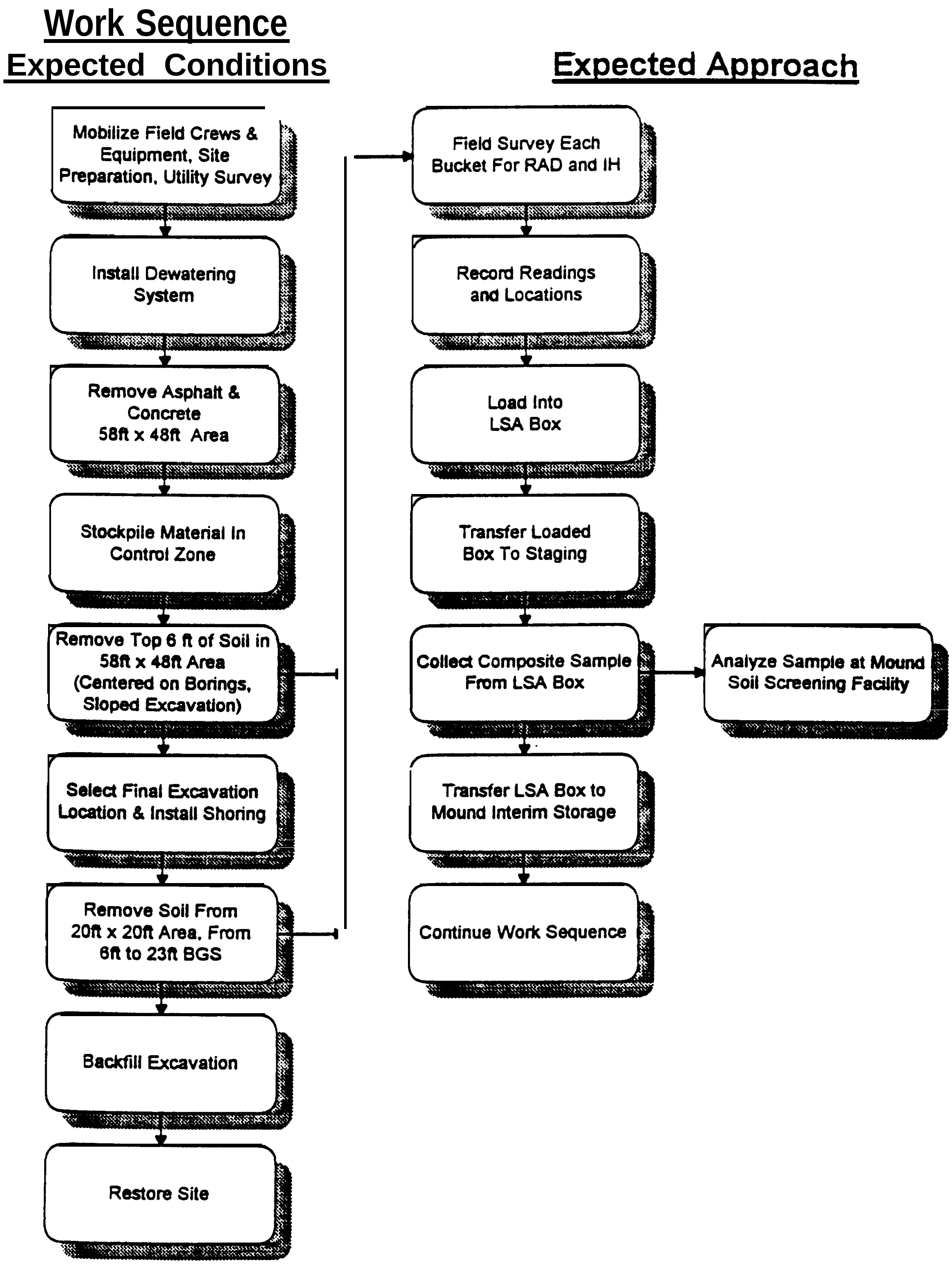

Figure 3.5. Design Flow Diagram
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Contingencies - Decision Model

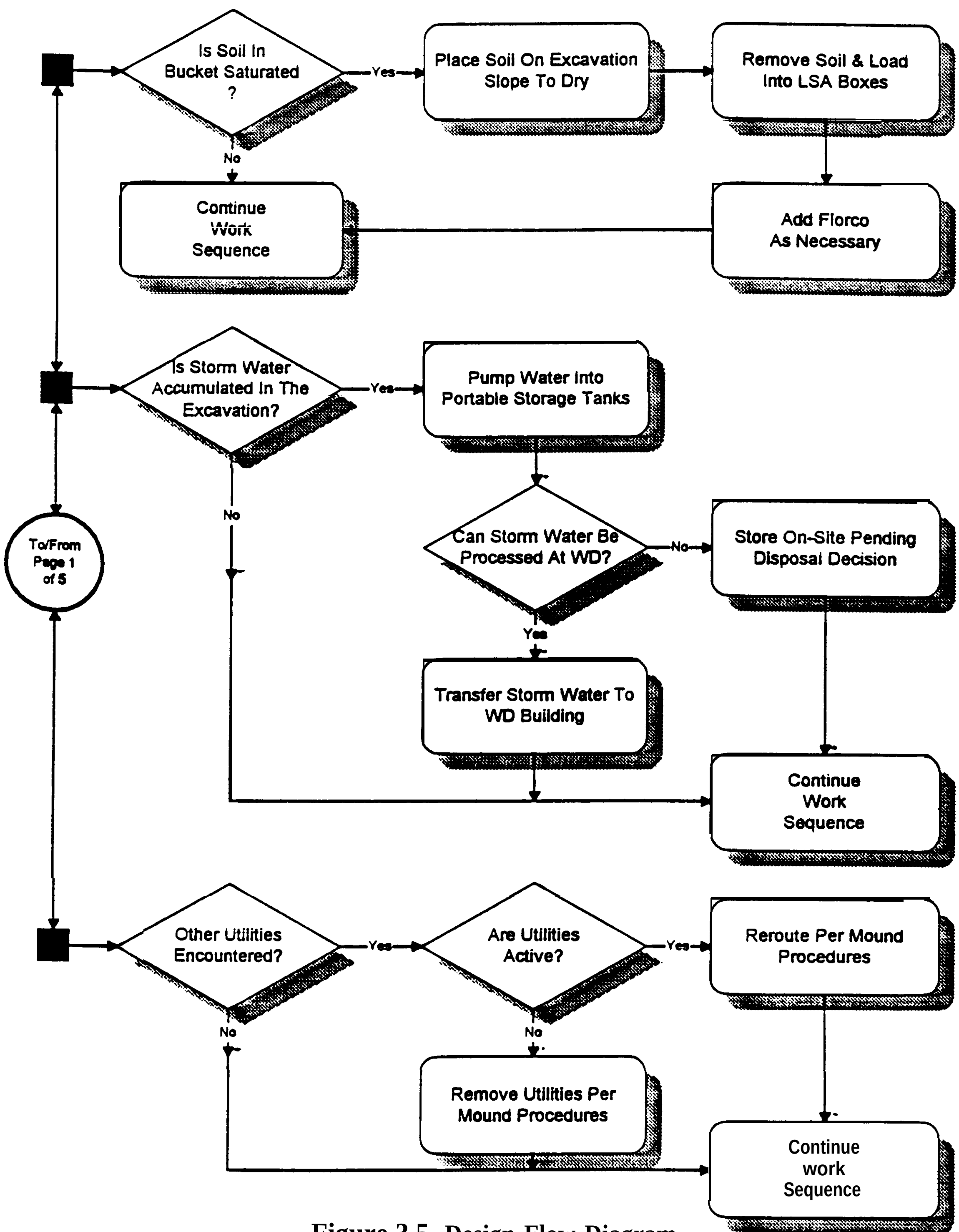

Figure 3.5. Design Flow Diagram
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Contingencies - Decision Model

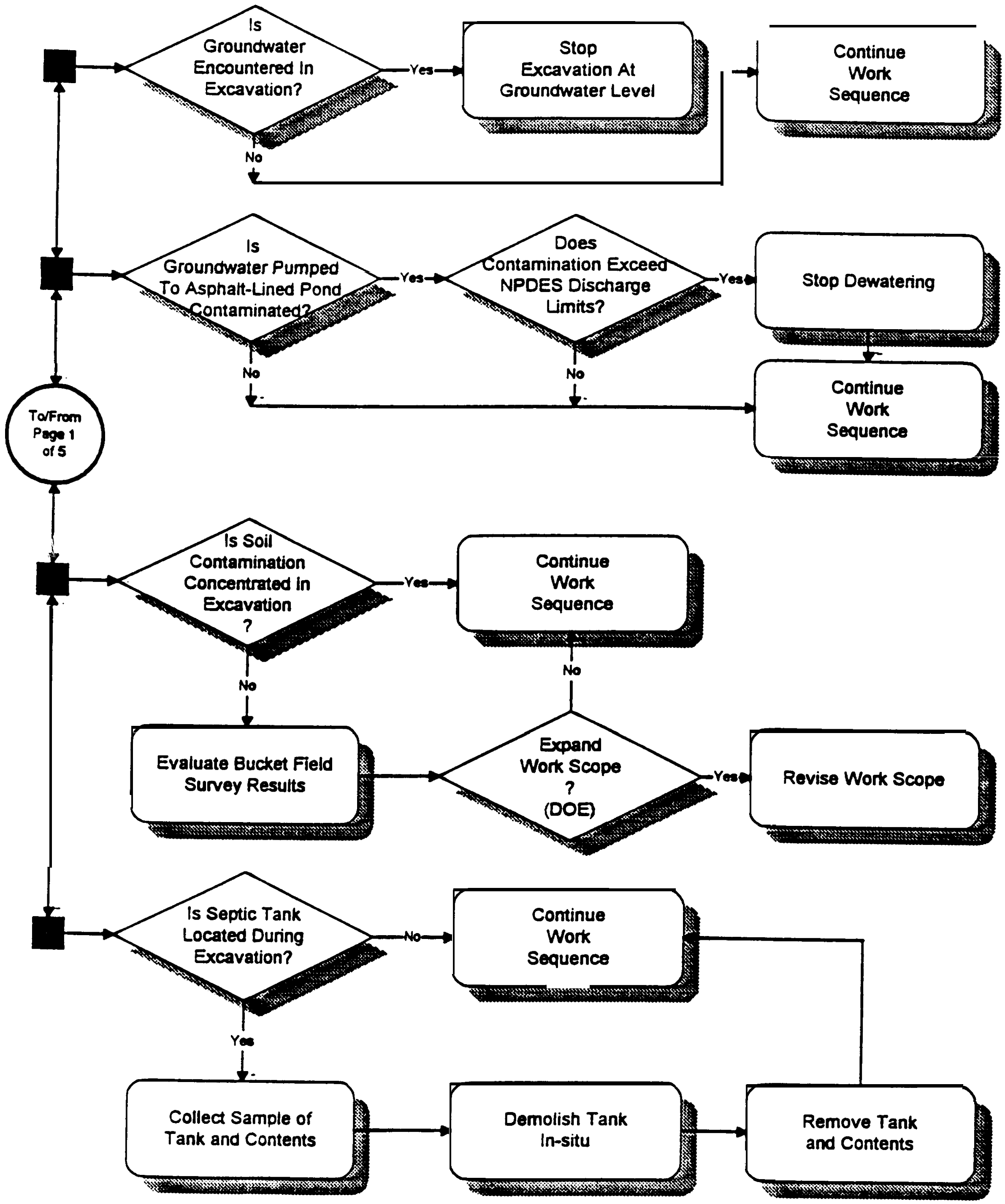

Figure 3.5. **Design Flow Diagram**
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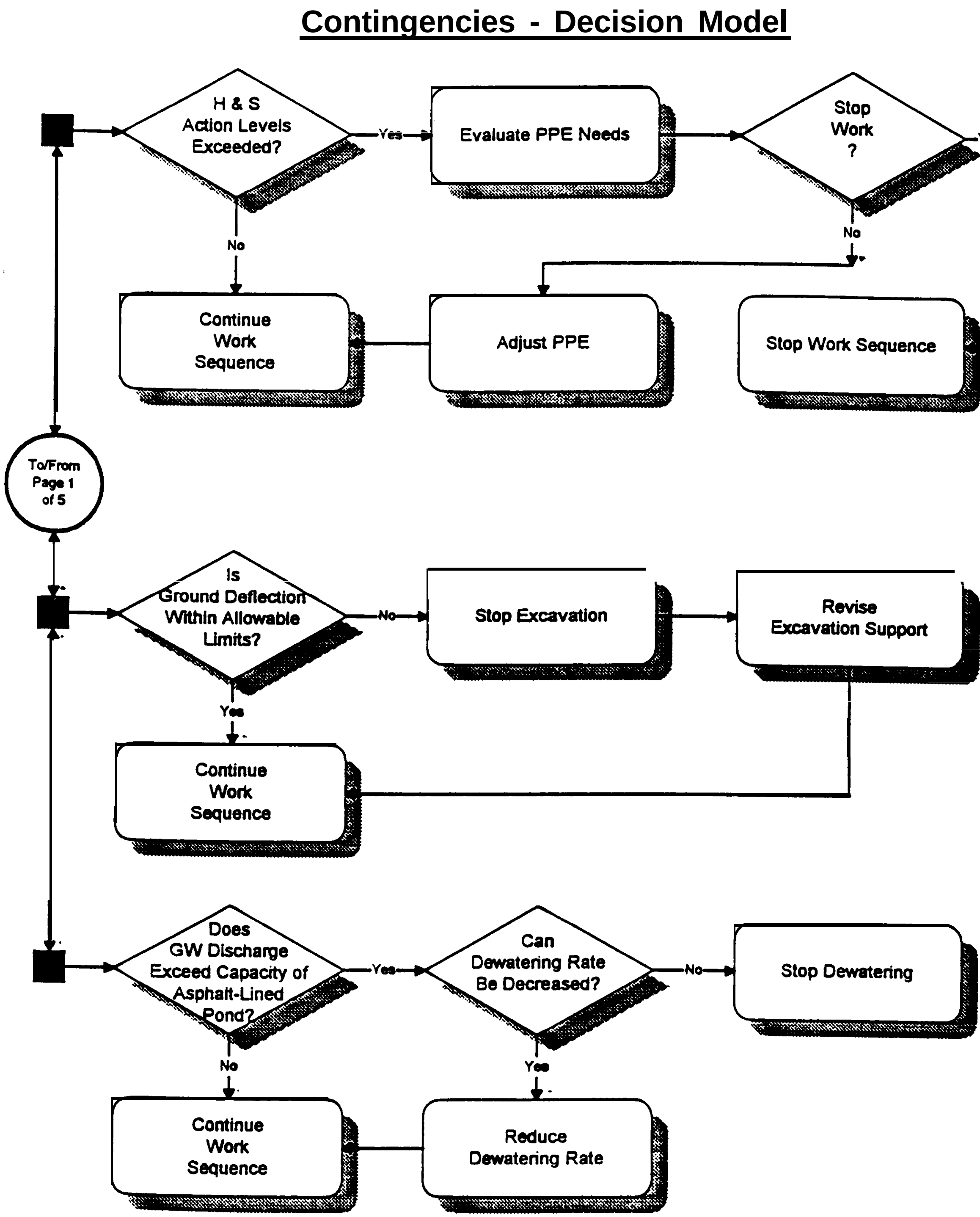

Figure 3.5. Design Flow Diagram
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Contingencies - Decision Model

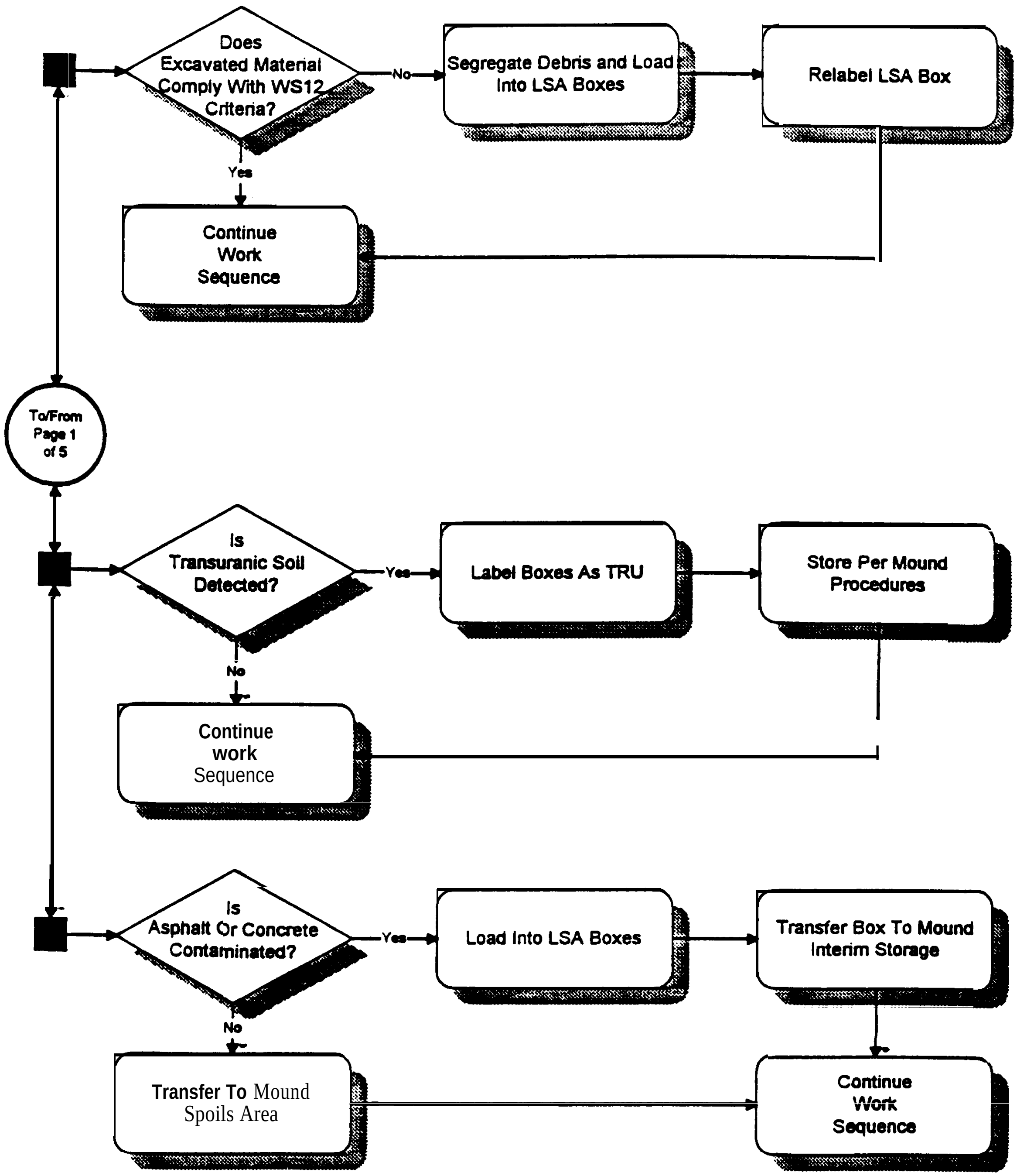

Figure 3.5. Design Flow Diagram
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Note F, **Time-Critical Removal Action Logistics Checklist.**

ARARs compliance. Complying with ARARs may require some preparations. For example, if compliance with a National Pollutant Discharge Elimination System (NPDES) discharge limit is necessary, some preparations will be necessary for sample analysis and monitoring **as** well as reporting on compliance. Any ARAR that will require specific actions during the removal is likely to require some preparations prior to or during mobilization.

Procurement of contractors and specialty subcontractors. Many removal actions at DOE facilities will be implemented using site forces, thus reducing or eliminating the need to procure outside services for a time-critical removal action. However, many removal actions are likely to require procurement of at least specialty subcontractors for treatment, disposal, or certain special aspects of construction (e.g., a shoring subcontractor). Procurement can require several months and may need to begin during the planning phase. For emergency actions (time-critical removals frequently qualify), provisions in the Federal Acquisition Regulations and DOE Orders allow some of the procurement requirements to be waived, thus enabling rapid procurement of special services, equipment, or materials.

Equipment and materials acquisition. Any special equipment, especially if it will have to be fabricated or cannot be obtained locally, will require some lead time. For a time-critical removal, acquisition of such equipment or materials should begin as soon as the need is identified.

Utilities (providing power, water, septic, etc. during removal action). Utility services to support the removal action will often be problematic at DOE sites because of the remote locations of some removal action sites or site security requirements. Generators may be required if electrical power is unavailable. Potable water, toilet/shower facilities, and fuel requirements must be assessed and resolved prior to or during mobilization.

Permits. Removal actions, if conducted entirely onsite, are exempt from permits that would otherwise be required (though the substantive requirements may have to be met). Some permits (e.g., modifications to NPDES permits, and excavation permits) may be required. Lead time required for permitting issues can easily delay a time-critical removal. Necessary permits should be identified and work toward obtaining them begun as early as possible during the planing phase.

Site access. Access to the removal site will typically not be a problem at a DOE site unless the removal is offsite (i.e., not on the DOE facility property). Access to adjacent areas that might be needed (e.g., for a staging area) or access to or through adjacent private property can be difficult to arrange. Any site access needs should be identified and work toward obtaining access should be begun as early as possible during the planing phase.

Staging areas. Space to implement the removal action typically will greatly exceed the immediate area of contamination. Space for access routes, parking, material lay-down yards, temporary storage of wastes and other materials, sampling/analytical activities, offices, equipment staging and decontamination, and other activities must be arranged in advance of mobilization.

Decontamination (e.g., of equipment that leaves the site). Decontamination typically is needed for any equipment that will be removed from a facility or that will be moved between waste units during a removal. Decontamination facilities and capacity are required for capture and treatment of any rinse water or other waste generated during decontamination. Space for a decontamination facility is one of several needs for a staging area adjacent to the removal site.

Site security. Because of the secure nature of most DOE sites, security during the removal action typically will not be a problem at a DOE site. However, removals in offsite areas or in any non-controlled area typically will require some arrangements for security. Security typically will be necessary for property protection and safety reasons.

Utility location/relocation (e.g., buried pipelines, buried power lines). Location of buried utilities in offsite areas is no different than for any private sector excavation project. However, onsite utilities can be difficult to locate at DOE sites because of the age of the facilities and the urgency under which many were constructed and modified. Documentation of underground utilities often is less than perfect at DOE sites. Working near aboveground and overhead utilities also can present challenges that must be identified and addressed early.

Management of remediation-derived wastes (i.e., treatment, storage, and/or disposal; temporary or permanent). Wastes have to be managed properly when taken from a site or otherwise generated during a removal action. Hazardous, radioactive, and mixed wastes have special requirements; but, even solid wastes have to be managed in accordance with local requirements. Plans for storing, treating, and disposing of all wastes generated during the removal action are a significant requirement during the planning phase. Space for temporary facilities; meeting the substantive requirements for a permit for a storage, treatment, or disposal facility; constructing treatment, storage, or disposal facilities; and/or arranging for offsite treatment, storage, or disposal can require considerable lead time. Such needs should be identified early in the planning phase and work on these issues should begin as soon as the need is identified.

Health and safety. Health and safety protection during the removal action is an important responsibility. Acquisition of the necessary Personal Protective Equipment (PPE), decontamination of reusable equipment, and disposal of used equipment are major considerations. Large removal actions can result in a need for major facilities for showering, personnel contamination screening, and PPE maintenance and distribution.

Personnel training. Because many site personnel have been extensively trained, limited health and safety training and familiarization with the removal action may be the only requirement. However, use of offsite contractors requires attention to ensure that all personnel are properly trained. Health and safety training (40 hour training), site procedures training (e.g., fire, emergency evacuation), quality assurance training, radiation safety training, confined space entry training, and training in the specifics of the Health and Safety Plan for the removal action are examples of the types of training that may be required.

Transportation (e.g., **of** materials **and wastes).** Transportation of all materials, equipment, and wastes should be arranged prior to beginning mobilization. Transportation of wastes can be an especially sensitive issue if any of the transport is over public roads. Need for use of licensed hazardous waste haulers, special equipment (trucks without tailgates, roll-off boxes, liners, tarps), and other similar issues are common if transporting hazardous wastes or if transporting any wastes through residential areas.

Monitoring during **the** removal (e.g., for deviations, **of** offsite migration **of** contamination, **of** progress, **of** removal effectiveness). A monitoring plan should be included in the Removal Action Work Plan (see Step 6). Monitoring will be required to measure progress and/or direct the removal, detect deviations from expected site conditions (which may require implementation of a contingency plan), detect offsite migration of contamination, confirm compliance with ARARs (e.g., NPDES discharge limits), and confirm effectiveness/completeness of the removal action. Arrangements will have to be made for all of the sampling and analysis, or other measurements, required to monitor the removal action.

Analytical services during the removal. Analytical services may be required to facilitate monitoring the removal action, directing an excavation effort, characterizing wastes being removed, segregating wastes for different management requirements, or other needs. All analytical needs should be identified in the work plan (see Step 6) and provided for prior to or during mobilization.

Preparations for possible implementation of contingency plans. Contingency plans are not expected to be needed, otherwise the deviation that triggers one of them would be the expected condition. Still, it is necessary to be ready to implement any of the contingency plans. Any requirements of the contingency plans, including any or all of the other categories of preparations listed in this step, should be provided for, at least on a contingency basis. For example, if a contingency plan would require switching to a different means of excavation, some preliminary arrangements to provide the different equipment, contractor, or personnel typically will be required, if the contingency plan is to be implemented efficiently and quickly.

Progress tracking and reporting. Progress of the removal action typically is monitored on a daily basis for two reasons: (1) reporting progress by the On-Scene Coordinator (OSC) through pollution reports (POLREPS) and (2) compensating a removal action contractor or subcontractor, if compensation is on a unit cost basis. Arrangements for tracking progress (who, what, when) should be outlined in the work plan (see Step 6). Some preliminary steps generally are required during mobilization to ensure progress is measured from the very beginning of the removal.

Community relations during mobilization, during the removal action, and during demobilization. Time-critical removal actions do not benefit from the longer planning phase available to longer term actions (see Module 3, Preconceptual Design) and thus do not afford significant opportunity for the public to be informed about the action that is being contemplated, Consequently, community relations immediately prior to mobilization and during the removal action assume a more critical role than for an early action. Planning for community relations should begin prior to mobilization, as early in the planning phase as possible. Community relations may need to extend through the demobilization phase.

Operation and maintenance after completion of the removal. Most removals will not require a continuing operation and maintenance phase immediately following the field activities. However, removals that involve facilities or structures that will require maintenance (e. g., caps that require care until a vegetative cover is established) or removals that involve facilities that will require a period of continuing operation (e.g., operation of a treatment process for water collected with a french drain installed as part of the removal) require advance planning and arrangements to ensure that those responsibilities are carried out once the removal is completed. Personnel, contracting mechanisms, equipment and materials, and other similar issues should be resolved in the work plan (see Step 6).

Module 4
Non-Time-Critical Removal Actions and Early Remedial Actions

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4 Non-Time-Critical Removal Actions and Early Remedial Actions

4.1 Scoping

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4.4 EE/CA or FFS

4.5 Conceptual Design

4.6 Remedy Selection and Documentation

Module 4
Non-Time-Critical Removal Actions and
Early Remedial Actions

Background

Early actions are used only to respond to agreed on problems. Longer term early actions (e.g., non-time-critical removal actions or early remedial actions) are used to address site problems that are more complex (e.g., difficult logistics, intricate technology) than time-critical removal actions. Still, if an early action is being considered, it is because everyone can agree there is a problem that requires near-term intervention. If there is any serious question whether or not the site problem(s) under consideration require action, (e.g., if you need to do a risk assessment to decide if the problem(s) require action) then the site problem(s) are not yet appropriate for an early action process and should be deferred until the comprehensive Remedial Investigation/Feasibility Study (RI/FS) process can support a decision to take action.

The early actions discussed in this module do not require the long investigations or the development and evaluation of a full range of remedial alternatives required in the comprehensive RI/FS process. The evaluations and even the documentation for these early actions should be abbreviated. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) even allows consideration of a single alternative where appropriate:

> *"Few alternatives, and in some cases perhaps only one, should be developed for interim actions. A completed baseline risk assessment generally will not be available or necessary to justify an interim action. Qualitative risk information should be organized that demonstrates that the action is necessary to stabilize the site, prevent futher degradations, or achieve significant risk reduction quickly. " (See* Note A of the Introduction for full text.)

The need to take action is established during development of the phased response strategy and in the consensus memorandum. This module assumes that qualitative risk information – sufficient to support the decision to take action-was provided prior to development of the consensus memorandum. This same qualitative risk information is included as part of the dmumentation for non-time-critical removal or early remedial action and will be important in helping to establish objectives.

The Introduction to this guidance describes the entire early action process as shown in Figure 1. This module addresses two of the major phases of the early action process: the Decision and Design Support Phase and the Decision Phase. The third major phase, Detailed Design and Action is beyond the scope of this document.

Organization

Some of the information in this module is distilled from fuller explanations in the DOE RI/FS guidance. Many issues dealt with briefly in this module appear in the DOE RI/FS guidance as fill submodules. Two design steps (i.e., Submodules 4.3, Preconceptual Design, and 4.5, Conceptual Design) have been integrated into the planning and decision process.

Module 4 is divided into six submodules

4.1 Scoping
4.2 Limited Field Investigations
4.3 Preconceptual Design
4.4 Engineering Evaluation/Cost Analysis or Focused Feasibility Study
4.5 Conceptual Design
4.6 Remedy Selection and Documentation

Submodule 4.1 Scoping

Non-Time-Critical Removal Actions and Early Remedial Actions

- **4.1 Scoping**
- **4.2 Limited Field Investigations**
- **4.3 Preconceptual Design**
- **4.4 EE/CA or FFS**
- **4.5 Conceptual Design**
- **4.6 Remedy Selection and Documentation**

4.1 Scoping

- Evaluation of Site Understanding
- Establishing Specific Data Needs for the LFI
- Conducting Meeting of Extended Project Team
- Developing Early Action Work Plan

Submodule 4.1 Scoping

Background

Scoping for the early action began during the development of the phased response strategy and was carried further in the development of the consensus memorandum. In fact, the consensus memormdum maybe the only scoping required for many early actions. However, the types of early actions covered in this module include rather significant actions, potentially involving millions of dollars in remediation costs. These more extensive (and expensive) actions require greater effort in scoping.

The appropriate level of scoping effort has to be decided for each site. Through the scoping step, the extended project team must accomplish the following:

- Develop a sufficient understanding of the site problems to allow adequate planning.

- Confirm the objectives and remedial responses tentatively established in the consensus memorandum, including the qualitative risk information that supports action.

- **If necessary, develop a work plan for the early action**

Organization

Submodule 4.1 discusses the following:

- **Evaluation of site understanding**
- **Establishing specific data needs for the limited field investigation (LFI)**
- **Conducting meeting of extended project team**
- **Developing early action work plan**

In addition, more detailed information is provided in the following notes:

- **Note A – Example Outline for a Site Problem Understanding Writeup**
- **Note B – Example ARARs**
- **Note C – Example Early Action Objectives**
- **Note D – Example Early Action Work Plan Issues**
- **Note E – Example LFI Work Plan Outline**

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Sources

1. U.S. EPA, May 1988, *CERCLA Compliance with Other Laws Manual (Draft),* OSWER Directive 9234.1-01.

2. U.S. EPA, August 1989, *CERCLA Compliance with Other Laws Manual, Volume 2, EPA/540/G-89/O09,* OSWER Directive 9234.1-02.

3. U.S. EPA, December 13, 1991, *Risk Assessment Guidance for Superfund: Volume 1 –Human Health Evaluation Manual (Part B: Development of Risk-Based Preliminary Remediation Goals),* OSWER Directive 9285 .7-OIB.

4. U.S. EPA, September 1993(a), *Data Quality Objectives Process for Superfund,* Interim Final, EPA/540/G-93/07 1, OSWER Directive 9355.9-01.

5. U.S. EPA, August 1993(b), *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA, EPA/540/R-93/057,* OSWER Directive 9360.0-32.

6. DOE, September 1994, *CERCLA Removal Actions, DOE/EH-0435.*

7. *40* CFR 300, March 8, 1990, *National Oil and Hazardous Substances Pollution Contingency Plan,* Federal Register, Vol. 55, No. 46 Rules and Regulations.

Submodule 4.1 Scoping

1
Start.

2
Evaluate site **understanding.**

Go to Submodule 4.1 Note A and to DOE RI/FS Guidance Submodule 1.2 Note A.

NOTE:
The goal should be to extract the maximum amount of understanding from the available **data.**

3
Establish specific data needs for the **LFI.**

Go to **Submodule 4.1** Note B and Note **C.**

NOTE:
The consensus memorandum includes sufficient risk information to support the decision to take early **action.** Documentation of the risk evaluation will be part of site **understanding.**

Step **4** continued on next **page.**

Step 1. Start.

Step 2. **Evaluate site understanding.** The Department of Energy (DOE) internal project team (or extended project team, if appropriate) should visit the site to increase their understanding of the site problems and logistical issues. (See Submodule 1.2, Note A of DOE's RI/FS guidance for additional detail about items to include in the site visit.) This site visit may be particularly important for clarifying the boundaries/scope set in the consensus memorandum.

Available data are used for developing the initial understanding of the site conditions and site problems that will be addressed. Maximizing the use of available data avoids collection of additional data whenever possible.

Insufficient collection and interpretation of available data can result in overstatement of data needs or even in determining, incorrectly, that an early action is not feasible because of a lack of sufficient site understanding. The goal should be to extract the maximum amount of site understanding from the available data. An ongoing RI, an ongoing baseline risk assessment, or an existing RI/FS work plan for the entire operable unit (OU) should provide excellent sources of site information for an early action.

The results of the data collection and review should be briefly summarized in a description of site understanding, which can be used directly as Chapter 2 of the early action work plan. (See Step 6 below. Also see Submodule 4.1, Note A for an example outline of a site understanding writeup.)

All legitimate data needs for the early action process should support one or both of the two major activities of the decision and design support phase.

Step 3. **Establish specific data needs for the limited field investigation (LFI).** For those instances in which an LFI is required (see Submodule 4.2, Limited Field Investigations), the goal of this step is to develop a list of specific and carefully justified data needs. These specific data needs define the scope of the data collection effort.

Data that are not needed to support a decision or begin a design are usually unnecessary to the early action and probably should not be collected. Submodule 4.3, Preconceptual Design, provides details on necessary information for alternative(s) definition. Submodule 4.5, Conceptual Design, provides details on information required to support development of design criteria. Exceptions may involve stakeholder interests that are not directly relevant to these major activities or health and safety concerns for site workers during the remediation. In other instances, an LFI to support early actions may be a good opportunity for gathering data to support other activities (e.g., sitewide RI/FS activities, other early actions).

Some data gaps do not become data needs. The necessity to fill data gaps exists only if the uncertainties associated with the data gaps are not acceptable or cannot be managed. For example, assume that the extent of soil contamination at an early action site is known well enough to select the appropriate early action, to prepare an appropriate design, and to develop an order-of-magnitude cost estimate for excavation and disposal, but not well enough to lay out a detailed excavation plan. Detailed sampling could fill such a data gap.

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However, by using field screening techniques or field support laboratories, data collection *during excavation* activities is likely feasible and sufficient to determine the bounds of the excavation. Thus, this data gap may be acceptable because the uncertainty it causes can be easily managed during the response action; in that instance, it does not constitute a data need.

Data needs are formally developed through the data quality objectives (DQOs) process. The data needs description should include the data required, where they will recollected, when they will be collected (period and frequency), and the decisions in which they will be used. The latest EPA guidance documents on DQOs are listed in the Module 4 sources. (See DOE's RI/FS guidance, Submodule 1.4, for additional information on the DQO process.)

Identifying potential applicable or relevant and appropriate requirements (ARARs) during scoping helps identify potential waste management requirements and related data needs. Three types of ARARs are identified: chemical-specific, location-specific, and action-specific.

Chemical-specific ARARs may dictate remediation-level requirements and assist in early establishment of potential remediation goals and data needs. Location-specific ARARs are requirements that limit or restrict activities in certain areas (e.g., restrictions on actions in wilderness areas, wetlands, and flood plains). Identification of location-specific ARARs should begin during scoping, on the basis of current site understanding, and should be modified as site understanding increases. Early identification of location-specific requirements can help in identifying and focusing allowable response actions and in appropriately conducting the actual early actions. Action-specific ARARs restrict or regulate remediation, treatment, or disposal activities. Identification **cm** begin with current site understanding because the likely remediation approach is known in an early action. Action-specific ARARs need to be evaluated to determine if they restrict or regulate the scope of the action. See Submodule 4.1, Note B for an example list of ARARs .

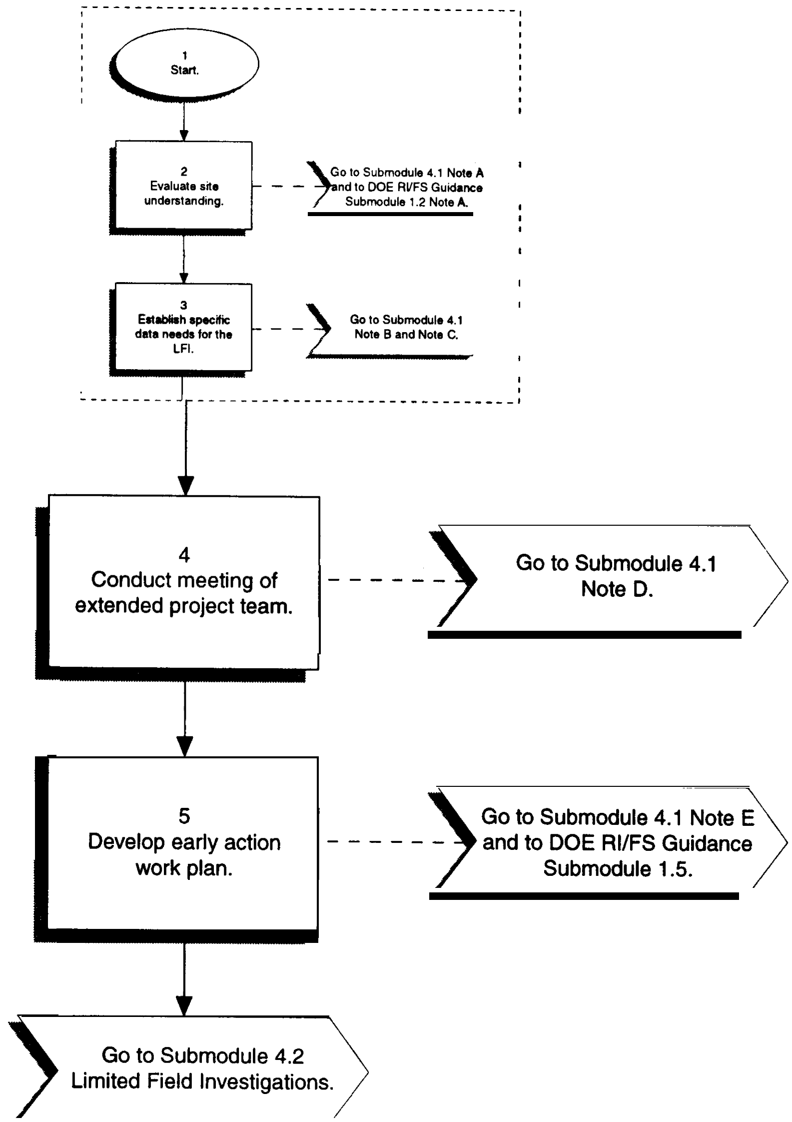
Early action objectives were initially identified and agreed to by the extended project team in the consensus memorandum (see Submodule 1,2, Development of a Consensus Memorandum). The initial objectives may need to be revised on the basis of additional site problem understanding found through review of available data, development and evaluation of the conceptual site model, and ARARs. Any change in the objectives may imply new data needs. See Submodule 4.1, Note C for example early action objectives.

Initial definition of remedial alternatives usually results in identification of data needs. The alternative(s) must be fully defined in the Engineering Evaluation/Cost Analysis (EE/CA) or Focused Feasibility Study (FFS) and later designed in detail. Both processes require information about the site, about the wastes that will be generated, treated, or disposed of, and about numerous other potential questions.

During scoping, the alternatives must only be defined sufficiently to facilitate identification of data needs. Typically in a work plan for a comprehensive RI/FS, the alternatives are little more than identified by general response actions and perhaps some indication of the technologies that might be used. Alternative(s) definition can be carried further during scoping for an early action than would be typical in a work plan for a comprehensive

Submodule 4.1 Scoping (continued)

Submodule 4.1 Scoping (cont.)



NOTE:
The conceptual site model is the current understanding of how the site works.

NOTE:
Basic principles of DQO:

1. Data are collected to support specific decisions.
2. Data needs are identified by the data users for the data collectors.
3. No data should be collected unless (a) a specific decision can be identified requiring additional information, (b) the resulting action can be identified, (c) the amount and the type of data required to support the decision can be specified, and (d) the method of evaluation can be specified.
   See Superfund's DQO guidance (EPA 1993) for more detail.

NOTE:
ARARs identification is restricted only to those that relate to the early action being taken. Neither the ARARs analysis process nor specific ARARs should be allowed to impede development and implementation of an early action if the ARARs can be addressed later (i.e., in the final action).

RI/FS, because the likely (Overall approach and major features of the early action were agreed to in the consensus memormdum. The features of the alternative(s) can be worked out beyond the level of mere general response actions to indicate in outline how the alternative might actually be implemented. This streamlines both the decision and design processes in the following ways: (1) data gaps that must be filled by an LFI become more apparent; (2) the alternative(s) definition effort is carried further in the parallel effort to develop the preconceptual design (see Submodule 4.3, Preconceptual Design) that is used directly as one chapter of the EE/CA or FFS; and (3) work toward the conceptual design (see Submodule 4.5, Conceptual Design) is thus begun during scoping.

Step 4. **Conduct meeting of extended project team.** A meeting of the extended project team is essential during scoping to ensure a common understanding of the site problem(s) and proposed remedial approach, Two key agenda items are discussion of technical issues and identification of regulatory agency issues and concerns, including ARARs and potential waivers. Submodule 4.1, Note D provides a list of potential early action issues.

The agenda should be developed to encourage discussion of the conceptual site model and how the LFI, if any, will be used to reduce critical uncertainties in the conceptual site model. The meeting should include a technical presentation of the current site understanding, the initial strategy for addressing key data gaps, a list of uncertainties that have been identified as manageable, and a proposed approach for managing the uncertainty. DOE and DOE contractor technical project staff should make the technical presentation.

Step 5. **Develop early action work plan.** A work plan should be developed that details activities and decision points for the ealy action process through the decision phase and preparation of the Action Memormdum or ROD. The majority of the activities will occur in the decision and design support phase. The length and formality of the work plan will vary greatly, depending on the scope of the action. For small actions, the consensus memormdum, with some addendums, can seine as the work plan. For large-scale actions, especially those costing several million dollars, a more formal plan is essential; any project of such magnitude requires careful planning.

Still, the work plan should not mimic the full development of understandings and concerns typical in a work plan for a comprehensive RI/FS. A work plan for an early action that will not require an LFI may typically be 50 pages or less, including appendices. (The planning required for an LFI would substantially increase this number.)

If an LFI is needed, the work plan contains all of the detailed planning for the field efforts, for data management, validation, and evaluation, and for development of the LFI report. The LFI issues may constitute the majority of the work plan.

An example outline for a removal action work plan that can be used as an early action work plan is provided in Module 3, Note D. An example LFI work plan outline is provided in Submodule 4.1, Note E. Additiond detail on development of work plans is provided in DOE's RX/FS guidance, Submodule 1.5.

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Note A. **Example Outline for a Site Problem Understanding Writeup. The** documentation of the site problem understanding forms a section of the early action work plan. The focus of the understanding should be limited to facts, assumptions, and frank discussion of uncertainties that are relevant to the early action. This understanding should not address OU or sitewide issues unless they directly impact the early action. For example, Section 1.3, Known and Potential Contamination, should only include discussion of the known and potential contamination as appropriate to the specific site problem(s) being addressed by the early action. Specific media that are not relevant to the site problem(s) should be noted as such.

1.0 Site Problem Background

1.1 Operable Unit Site Description

1.1.1 Facility identification
1.1.2 Location
1.1.3 History of operations
1.1.4 Waste-generating processes
1.1.5 Waste facility characteristics
1.1.6 Other engineered structures
1.1.7 Interactions with other site problems

1.2 Physical Setting (as appropriate)

1.2.1 Topography
1.2.2 Geology
1.2.3 Geohydrology
1.2.4 Surface water hydrology
1.2.5 Meteorology
1.2.6 Environmental resources

1.3 Known and Potential Contamination (as appropriate)

1.3.1 Sources
1.3.2 Soil
1.3.3 Groundwater
1.3.4 Surface water and river sediment
1.3.5 Air
1.3.6 Biota
1.3.7 Conceptual site model

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<u>Note B</u>. **<u>Example ARARs</u>**

It is only necessary to identify ARARs that relate to the actions being considered. Early actions are not final actions, and the Record of Decision (ROD) will not be a final ROD. Therefore, many ARARs may not apply or may be formally waived pending development of the final remedy and ROD.

Specific ARARs should not be allowed to impede developing and implementing an early action if the ARARs in question can be addressed later. Use of the "interim action waiver" [Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121(a)] is encouraged and necessary if early actions are to be used to maximum value at DOE sites and if a phased response is to succeed in moving site problems into active remediation. ARARs need to be evaluated only to identify critical standards that dictate how an action must be performed.

CERCLA Compliance With Other Laws Manual (Parts 1 and **2)** (EPA, 1988; 1989) and *Risk Assessment Guidance for Supefund: Volume 1 –Human Health Evaluation (Part B: Development of Risk-Based Preliminary Remediation Goals)* (EPA, 1991) are helpful in developing preliminary ARARs. *Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA* (EPA, 1993b) addresses the timing of various aspects of identifying ARARs and documenting the reasons for waivers.

Following is a list of example ARARs for early action.

Chemical-Specific ARARs

- State regulations for soil cleanup
- Nuclear Regulatory Commission (NRC) standards for soil protection
- State radiation protection standards
- State radiation emission standards
- Clean Water Act (CWA) discharge regulations
- Toxic Substances Control Act (TSCA) requirements for polychlorinated biphenyl (PCB) spill cleanup
- EPA radiation protection standards for managing and disposing of spent nuclear fuel; high-level and transuranic (TRU) radioactive wastes
- National and state air emission limits

Location-Specific ARARs

- Resource Conservation and Recovery Act (RCRA) treatment, storage, and disposal (TSD) siting requirements
- Executive Order 11990 on wetlands (if wetlands are part of action or are affected by action)
- Executive Orders 11988 and 11990; actions within a floodplain (if floodplains are part of action or are affected by action)
- CWA Section 404 wetlands protection (if wetlands are part of action or are affected by action)
- Protection of areas that are part of the National Wildlife Refuge system
- National Historic Preservation Act (if historically designated resources are part of early action)

Action-Specific ARARs

Any of the chemical-specific ARARs can control the design and implementation of remedial actions. In addition, note the following.

- RCRA TSD facility requirements
- RCRA land disposal restrictions (LDRs)
- U.S. Army Corps of Engineers (USACE) dredging and filling permits (if wetlands are affected)
- National Pollutant Discharge Elimination System (NPDES)
- Endangered Species Act (ESA)

Note B: Example ARARS (continued)

Note C. **Example Earlv Action Objectives.** Objectives for early actions are focused on specific actions that will be taken (e.g., remove drums, stabilize berms, control access).

Risk reduction is generally inherent in the action to be taken; quantitative risk reduction goals are left to the final ROD, except where the early action will completely address a site problem. Quantitative goals may be part of early action objectives if they can easily be determined from regulatory standards.

Early action objectives should be as specific as possible while recognizing site uncertainties. Vague objectives can lead to unclear ending points and to later disagreements about the appropriate scope for the early action.

Examples of specific early action objectives are:

- Remove the radioactively contaminated soil from the drainage channel in which it was placed and store it (for a period of up to 10 years) in a secure manner awaiting selection of a final treatment/disposal alternative in the final ROD.

- Excavate the shallow drum disposal site; remove any drums containing wastes or waste residues; remove all soil contaminated with greater than 50 parts per million (ppm) total organic halogen (TOX); and stabilize the trench in a manner that minimizes infiltration and further spread of contaminants until the final remediation.

- Design and install a pump-and-treat system capable of halting the further spread of the uranium plume in the shallow aquifer. The plume will be contained for up to 5 years to allow further investigation and development of remedial alternatives for the sources of the plume. Extraction and treatment of the groundwater will be accomplished at the lowest operating costs by a technology that will reliably yield water below Maximum Contaminant Levels (MCLS) for all contaminants.

- Stabilize the contaminated surface soils against wind and water erosion and isolate the soil from potential intruder exposure pending development of final remedial options. Stabilization will be accomplished by technology that will provide reliable effectiveness while minimizing later treatment and disposal costs during final remediation.

- Remove all hot spots above agreed-to action levels in the area of the lay-down yard and dispose of in the low-level waste (LLW) disposal facility. Regrade and reseed the disturbed areas to reestablish native vegetation.

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<u>Note D</u>. **<u>Example Early Action Work Plan Issues</u>.** If a work plan is developed, the following issues (some of which were first addressed in the consensus memorandum) should be considered for inclusion:

- Purpose and scope of the early action
- Objectives of the early action
- Remediation alternative(s) considered for the early action
- Preliminary consensus on management of remediation-derived wastes
- Potential ARARs and the preliminary conclusions of the extended project team about achieving or waiving each potential ARAR
- Qualitative risk information that supports decision to take action
- OU background and setting, including probable conditions and uncertainties
- Rationale, including results of using the DQO process
- Approach
- LFI tasks (including data evaluation and report)
- Management of IDWS
- FFS or EE/CA tasks and scope (e.g., focus only on selected alternatives)
- Preconceptual design tasks (see Submodule 4.3)
- Decision and documentation tasks
- Schedule
- Project management
- Appendices [e.g., Sampling and Analysis Plan *(SAP), Quality* Assurance Project Plan (QAPP), Investigation-Derived Waste (IDW) Plan, Community Relations Plan *(CRP)]*

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Note E. **Example LFI Work Plan Outline. The** work plan for an LFI is a focused document, which ensures that the collected information fills the identified data gaps. Data collected during an LFI have a critical role in supporting the early action; these data must be collected correctly and with appropriate quality assurance/quality control (QA/QC) for the intended users. Although an LFI work plan is much shorter than an RI work plan, certain elements still must be carefully defined.

The outline below is a suggested format for an LFI work plan. Because of the limited focus of the LFI, work plan sections that discuss risk assessments, remdial action objectives, operable unit site descriptions, physical setting, and RI/FS tasks are purposely omitted.

1.0 Introduction
- 1.1 Purpose and scope of the LFI
- 1.2 Goals of the LFI

2.0 Statement of problem
- 2.1 Description of problem/contamination
- 2.2 Description of contaminated media within the scope of the LFI

3.0 Initial evaluations (to determine if those areas generate critical data needs)
- 3.1 Potential ARARs
  - 3.1.1 Chemical-specific requirements
  - 3.1.2 Location-specific requirements
  - 3.1.3 Action-specific requirements
  - 3.1.4 To-be-considered requirements
- 3.2 Applicable technologies
  - 3.2.1 Likely early action
  - 3.2.2 Alternative early actions

4.0 Rationale and approach
- 4.1 Rationale for data collection approach
  - 4.1.1 Contamination conditions
  - 4.1.2 Data gaps
  - 4.1.3 Sampling needed to fill data gaps
  - 4.1.4 Technology needed to sample the data gaps
- 4.2 Specific approach to fill data gaps
  - 4.2.1 Use of available data
  - 4.2.2 Data collection for specific purposes
  - 4.2.3 Data needs and objectives
  - 4.2.4 Projected volumes of waste
  - 4.2.5 Contaminants
  - 4.2.6 Investigation methodologies
  - 4.2.7 Data evaluation methodologies
  - 4.2.8 Treatability study
  - 4.2.9 Minimizing waste generation

5.0 Community Relations

6.0 QA/QC Plan

7.0 Schedule

8.0 Project Management

9.0 References

Note E: Example LFI Work Plan Outline (continued)

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Submodule 4.2 Limited Field Investigations

Non-Time-Critical Removal Actions and Early Remedial Actions
4.1 Scoping
4.2 Limited Field Investigations
4.3 Preconceptual Design
4.4 EE/CA or FFS
4.5 Conceptual Design
4.6 Remedy Selection and Documentation

4.6.1 Non-Time-Critical Removal Actions
• Fieldwork Mobilization
• Data Management and Validation
• Data Evaluation
• LFI Report

Submodule 4.2 Limited Field Investigations

Background

New data may not be required to sustain the design and decision support phase of early actions. However, a very focused data collection effort may be appropriate if new data are required to resolve data needs identified during scoping. In this document, a short-term, focused data collection and analysis effort used to support early actions is called a limited field investigation (LFI).

The data collected and analyzed through an LFI are used to refine the conceptual site model. As the conceptual site model is updated with the new information, the data gaps, significant uncertainties, and site understanding will change and directly influence the objectives or course of the early action.

For efficient implementation, LFIs require planning similar in format to the fieldwork planning in an RI/FS work plan, but with less detail. The majority of the planning is incorporated into the work plan (see Submodule 4.1, Step 5). However, additional considerations must be addressed separately as part of fieldwork mobilization.

Federal Facilities Agreements (FFAs) may have specific implementation requirements for field investigations and should be consulted.

Organization

Submodule 4.2 discusses the following:

- Fieldwork mobilization
- Data management and validation
- Data evaluation
- LFI report

In addition, more detailed information is provided in the following notes:

- Note A –Typical LFI Data Needs
- Note B – Suggested LFI Report Format

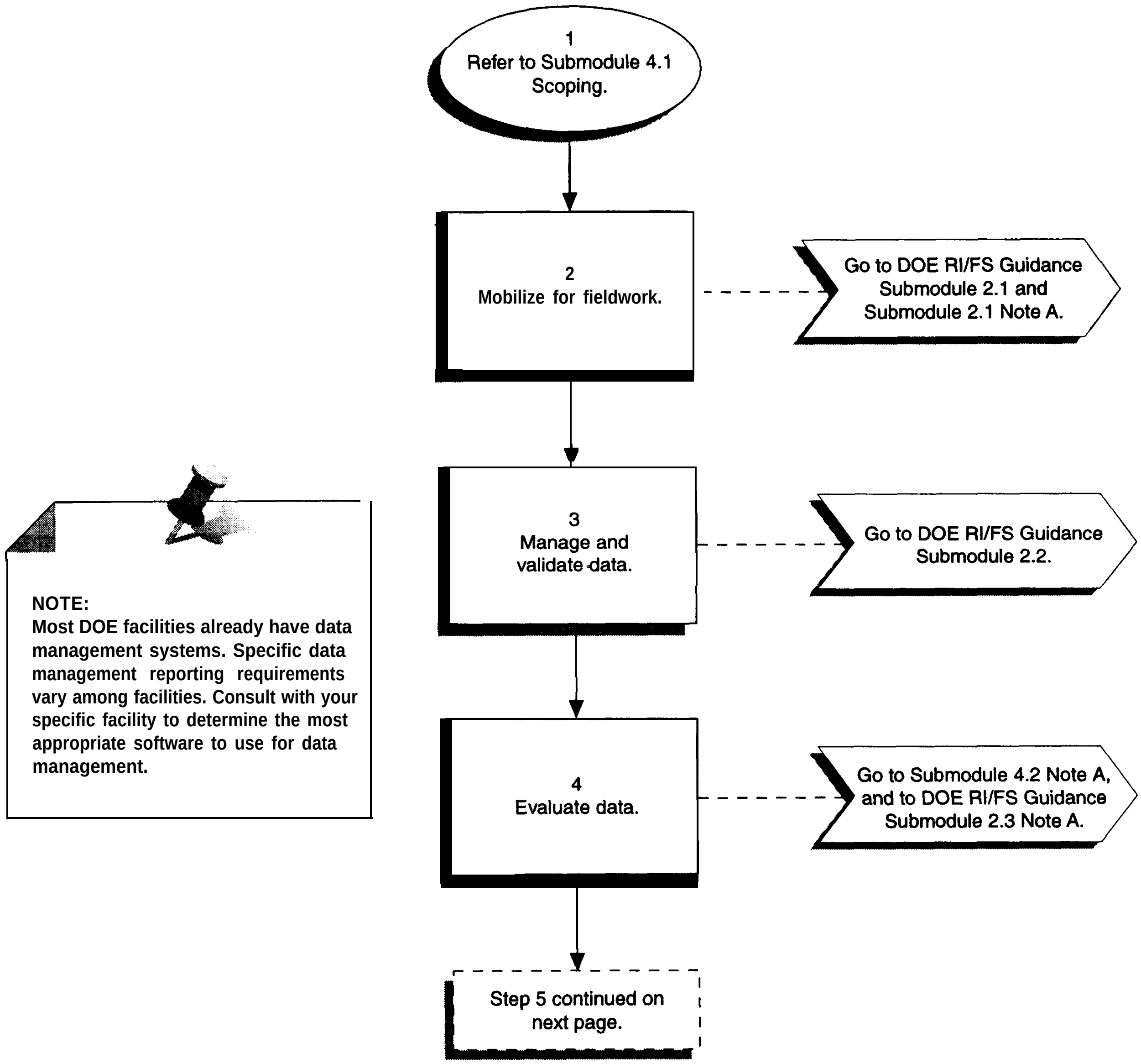
Sources

1. U.S. EPA, April 1992, *Guide to Management of Investigation-Derived Wastes,* OSWER Directive 9345.3-03FS.

2. DOE, September 1994, *CERCLA Removal Actions, DOE/EH-0435.*

3. *40* CFR *300,* March 8, 1990, *National Oil and Hazardous Substances Pollution Contingent Plan,* Federal Register, Vol. 55, No. 46 Rules and Regulations.

Submodule 4.2 Limited Field Investigations



Step 1. Refer to Submodule 4.1, Scoping.

Step 2. **Mobilize for fieldwork.** In addition to the standard mobilization issues that pertain to any fieldwork (e.g., utilities, facilities, equipment and supplies, vehicles, health and safety), there are several mobilization issues that are specific to investigation field efforts or that are particularly difficult at some DOE sites and that the DOE Project Manager must ensure are resolved prior to or during mobilization. Mobilization issues specific to investigation field efforts are:

- Procuring laboratory services (possibly including a field screening laboratory)
- Arrangements for decontamination of vehicles and equipment
- Management of investigation-derived wastes
- Sample management
- Managing analytical results and field information

The following mobilization issues can be particularly difficult for DOE facilities:

- Procurement
- Organization and management of the fieldwork
- Personnel training
- Quality assurance oversight
- Site access and security
- Permits (including excavation permits)
- Communications during fieldwork

Information on all of these mobilization issues is provided in DOE's RI/FS guidance, Submodule 2.1 and Submodule 2.1, Note A.

Step 3. **Manage and validate data.** Refer to DOE's RI/FS guidance, Submodule 2.2 for information and references on data management, validation, and usability review.

Step 4. **Evaluate data.** Data evaluation is more focused for an early action. Emphasis is placed on the physical nature and extent of the waste units and other media or site problems to be remediated. Data evaluation activities include the following:

- Examining the data

- Developing brief summaries of the data using text, maps, conceptual drawings, graphs, or tables. This work results in essential materials that can be used directly in the LFI report.

- Reviewing the summaries of the data to identify inconsistencies and/or unexpected results (e.g., outliers)

The evaluation focuses on three areas:

- **Site physical characteristics.** Types of physical data commonly collected and LFIs are listed in DOE's RI/FS guidmce, Submodule 2.3,

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Note A. Physical characteristics of a site generally include topography, geology, hydrogeology, surface water features, groundwater and surface water interactions, and meteorology.

The results of evaluating physical characteristics are used to confirm and/or revise relevant elements (e.g,, soil types, aquifer boundaries, and physical characteristics) of the conceptual site model developed during scoping. Physical characteristics are important to understanding contaminant extent and potential for migration, waste unit features, probable response of an aquifer to various pumping schemes, and other similar issues.

Note the necessity to review the DQOs established for the physical data elements and the decisions that the data were to support. Data collected during the LFI frequently render some of the decisions and therefore the DQOs obsolete or invalid. Following is an example of the type of situation that may be encountered:

The conceptual site model included drawings of the assumed location and rectangular configuration of a drum disposal area. A ground-penetrating radar investigation showed that the location of the area was correct, but that its longitudinal axis was actually oriented perpendicular to that indicated by site records.

- **Evaluate nature and extent of contamination.** In many instances, the majority of the data collected during an LFI addresses nature and extent of contamination. For an early action, nature and extent of contamination should be evaluated and documented only to the extent necessary to facilitate the early action decision or design. Presentations of the data and the results of the evaluation will appear in the LFI report. This should be sufficient to enable the stakeholders to understand the nature of the early action to be undertaken and its likely effectiveness. The data and the evaluation results should also support development of the design criteria (see Submodule 4.5, Conceptual Design).

  Data for nature and extent of contamination have three major uses:

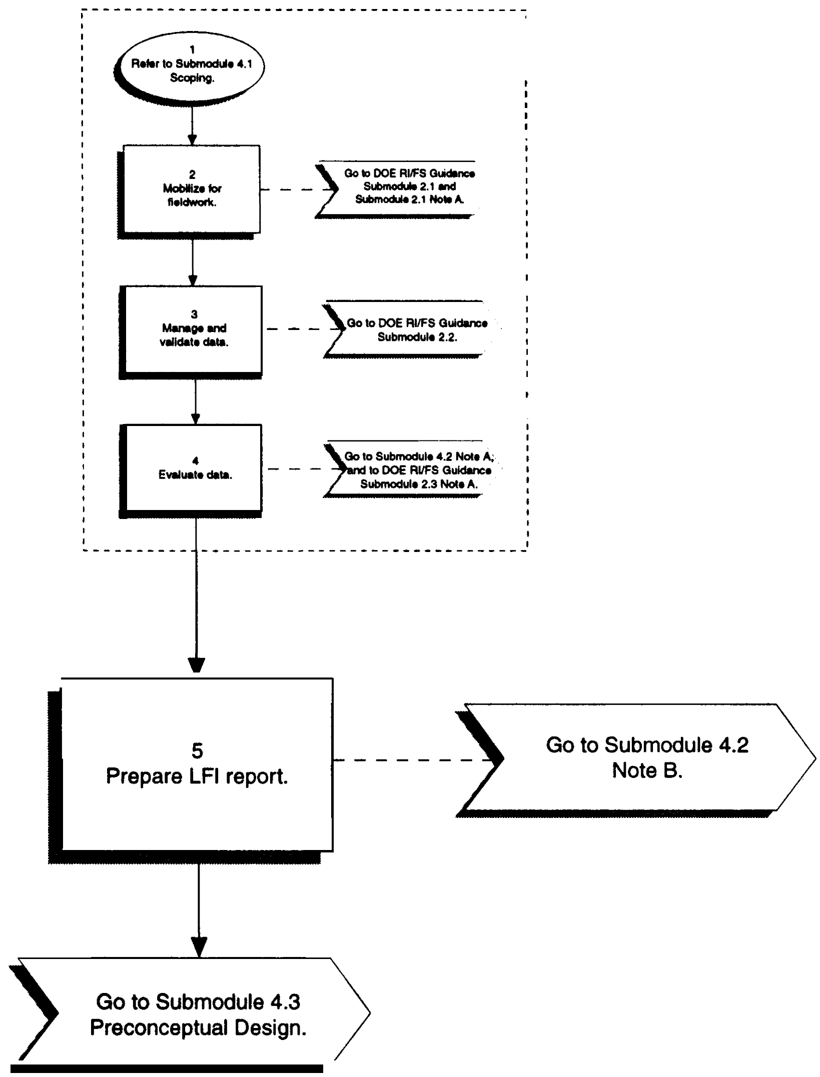
  To support the qualitative risk assessment (e.g., contaminant concentrations, spatial distributions and variability, and pathways) initially documented in the consensus memorandum

  To support ARARs evaluations (e.g., RCRA status of remediation-generated wastes)

  To support technology evaluations and designs (e.g., contamination levels, volumes of wastes, and/or contaminated soils)

  Examples of typical information needed to support these three purposes are presented in Submodule 4.2, Note A.

Submodule 4.2 Limited Field Investigations (cont.)



- **Data Quality Objectives.** Determinations must be made regarding the DQOs established for the LFI data:

    Whether the DQOs, as originally formulated, remain valid for the site problems and the early action, as they are now understood

    Whether the DQOS have been met or whether significant data needs (original or newly identified) remain

  Agreement should be reached within the extended project team about whether the data needs have been met and whether the quality of the data will support the early action decision and design.

Step 5. **Prepare LFI report.** A draft LFI report is produced for review by the extended project team. Some of the sections will be prepared as technical memoranda during the data evaluation. Submodule 4.2, Note B presents an example outline for an LFI report to support an early action. (Some DOE facilities have standardized primary document outlines.)

The final LFI report should be made available to the extended project team and other stakeholders, should be included in the Administrative Record, and should be addressed at a public meeting if interest is expressed. Writing the LFI report should be relatively straightforward. Site compliance agreements and DOE policy statements may speciy who must review an LFI report.

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Note A. **Typical LFI Data Needs.** Typical early actions involve removal of source materials, temporary storage of waste in safer conditions than originally found in the environment, control of contaminant flow, or prevention of exposure to contaminants. Decisions identified during early action scoping may result in identification of data needs. For example, to support remedy selection, data needs may be divided into three main types: (1) data about physical characteristics; (2) data about nature and extent of contamination; and (3) other data needs, including information to satisfy regulatory and stakeholder concerns.

The following matrix identifies the most common types of early actions, the primary decisions associated with each, and the corresponding data needs and methods available to fill the needs. The methods focus on instrumentation that can provide real-time results to expedite implementation. Decisions and data needs related to regulatory stakeholder or health and safety concerns, which are very site-specific, are not shown in the matrix. These other decisions and data needs generally include the following:

- Decision: Whether the waste is a RCRA hazardous or mixed waste.

  Data Need: Chemical composition, history of generation of the waste, and the regulatory status of the waste.

- Decision: Whether exposures or risks exist that require special health and safety procedures during implementation.

  Data Need: Potential hazards to workers.

- Decision: Whether waste management permits or procedures require other information.

  Data Need: Waste characterization and identification.

Common Types of Action	Typical Decision	Site Physical Characteristic Data Needs	Suggested Methods to Fill Site Physical Characteristic Data Needs	Data to Characterize Nature and Extent of Contamination	Suggested Methods to Fill Nature and Extent of Contamination Data Needs
Buried container removal	The area needing removal.	Soil physical characteristics, such as moisture content and potential contamination interaction.	Soil surveys.	Container contents and surrounding soils (if a leak is suspected) should be chemically analyzed.	Field and laboratory analysis including pH, PID, FID, corrosion, and radiation should be considered.
	Optimal removal process.	Access limitations to the containers.	Map interpretation, field measurements, and documentation research for evaluating depth of burial, existing caps, or physical barriers.	The potential for release must be considered, on the basis of information that can assess leaks, container integrity, or extent of corrosion.	Determining container integrity through sampling and observation.
	Excavation, safety, and regulatory issues in certain physical environments.	Slope stability.	Field measurements for evaluating the slope stability.	The runoff potential, depth to water table, and distance to surface water bodies must be analyzed for estimating the extent of the potential contamination at levels of concern for early action.	USGS topographic maps, well logs, and local hydrology reports are sources of information that would provide these data.
	Safe excavation and removal and storage needs.	Container type, number, and condition.	Geophysical surveys for locating the buried items and estimating the number of buried containers.		

Common Types of Action	Typical Decision	Site Physical Characteristic Data Needs	Suggested Methods to Fill Site Physical Characteristic Data Needs	Data to Characterize Nature and Extent of Contamination	Suggested Methods to Fill Nature and Extent of Contamination Data Needs
Soil source ("hot spot") removal in surface or near-subsurface areas	Whether interaction between the source and other media has occurred.	Soil physical characteristics, such as water content and permeability.	Soil surveys.	Chemical nature of release for assessing the contamination levels.	Historical data, field, and laboratory analysis.
	Optimal removal process.	Access to the area.	Map interpretation, field measurements, and documentation research for evaluating depth of burial, existing caps, or barriers.	Extent of subsurface and surface migration for calculating volumes of materials to be excavated.	Field methods such as XRF, soil-gas, and radiation surveys may help define the contaminant plume, depending on contaminants.
	Area to remove.	Identifying the Source location.	Historical documents, aerial photography, USGS maps, and well-defined sampling plans are potential sources.	The potential for migration to other media such as runoff potential, depth to water table, and distance to surface water bodies.	USGS topographic maps, well logs, and local hydrology reports are sources of information that would provide these data.

Note A: Typical LFI Data Needs (continued)

Common Types of Action	Typical Decision	Site Physical Characteristic Data Needs	Suggested Methods to Fill Site Physical Characteristic Data Needs	Data to Characterize Nature and Extent of Contamination	Suggested Methods to Fill Nature and Extent of Contamination Data Needs
Surface runoff containment	Identifying an area where all of the drainage can be easily accumulated and treated. Designing the treatment area for preventing flooding and levying breakage.	The surface topography and drainage pattern. The climate and precipitation patterns.	USGS topographic maps and surveys for assessing where the drainage will accumulate. NOAA/NWS weather data and local newspapers for evaluating 100-year flood levels.	Chemical nature of release for assessing the contamination levels. Extent of subsurface and surface migration for calculating the volumes of materials to be excavated. The potential for migration to other media such as runoff potential, depth to water table, and distance to surface water bodies.	Historical data, field, and laboratory analysis. Field methods such as XRF, soil-gas, and radiation surveys for defining the contaminant plume, depending on the contaminants. USGS topographic maps, well logs, and local hydrology reports are sources of information that would provide these data.

Common Types of Action	Typical Decision	Site Physical Characteristic Data Needs	Suggested Methods to Fill Site Physical Characteristic Data Needs	Data to Characterize Nature and Extent of Contamination	Suggested Methods to Fill Nature and Extent of Contamination Data Needs
Groundwater plume containment	Plume contamination extent and mobility.	Hydraulic properties of the aquifer such as flow rates.	Aquifer pumping tests for assessing flow rates.	Chemical nature of release for evaluating contamination levels.	Historical data, field, and laboratory analysis.
	Direction of plume movement from the source.	Aquifer flow direction.	Monitoring well data for assessing flow rates.	locations of plume boundaries for assessing the volume and area of the contaminant plume.	Soil gas surveys and field analyses such as Hydropunch™ for mapping the plume for certain contaminants.
	The length of time involved for contaminants to migrate to the water table.	Vadose Zone properties.	Soil surveys.	Location of aquifer recharge/discharge areas for assessing whether any contamination is a direct source into or out of the aquifer.	USGS hydrologic maps for assessing the recharge and discharge areas of the aquifer.

Common Types of Action	Typical Decision	Site Physical Characteristic Data Needs	Suggested Methods to Fill Site Physical Characteristic Data Needs	Data to Charatierize Nature and Extent of Contamination	Suggested Methods to Pill Nature and Extent of Contamination Data Needs
Waste removal and packaging for temporary waste storage	Optimal removal process.	Access to the waste.	Map interpretation, field measurements, and documentation research for evaluating depth of burial, existing caps, or barriers.	Chemical nature of release for evaluating the contamination levels.	Historical data, field, and laboratory analysis.
	Ensuring that all unauthorized personnel remain away from the contaminated areas.	Site security.	A facility security plan is needed for implementing the necessary security measures.	Extent of subsurface and surface migration.	Field methods such as XRF, soil-gas, and radiation surveys will help define the area needing excavation, depending on the contaminants.
				The potential for migration to other media such as runoff potential, depth to water table, and distance to surface water bodies.	USGS topographic maps, well logs, and local hydrology reports are sources of information that would provide these data.
				Waste compatibility for container and staging purposes is necessary for waste that must be stored in a permitted/approved area.	Field and laboratory analysis such as pH, PID, FID, corrosion, and radiation must be completed.

Note B. **Suggested LFI Report Outline.**

1. Executive Summary
   1. Introduction
   1.1 Purpose of report
   1.2 Brief site background
      1.2.1 Site description
      1.2.2 Site history
      1.2.3 Previous investigations
   1.3 Report organization

2. Study Area Investigation
   2.1 Surface features (natural and man-made, topographic mapping, etc.)
   2.2 Contaminant source investigations
   2.3 Surface water and sediment investigations
   2.4 Geological investigations
   2.5 Soil and vadose zone investigations
   2.6 Groundwater investigations
   2.7 Radiological walkovers

   (If technical memoranda documenting field activities were prepared, they can be retained in the files and referenced in the report.)

3. Physical Characteristics of the Study Area
   3.1 Surface features
   3.2 Meteorology
   3.3 Surface water hydrology
   3.4 Geology
   3.5 Soils
   3.6 Hydrogeology

4. Nature and Extent of Contamination
   4.1 Results of data usability evaluation
   4.2 Results of site characterization (natural components and contaminants in some, but not necessarily all, of the following media)
      4.2.1 Sources (lagoons, sludges, tanks, etc.)
      4.2.2 Soils and vadose zone
      4.2.3 Groundwater
      4.2.4 Surface water and sediments
      4.2.5 Air

5. Conceptual Site Model/Risk Evaluation
   5.1 Sources
   5.2 Release mechanisms
   5.3 Pathways
   5.4 Receptors

Submodule 4.3 Preconceptual Design

Non-Time-Critical Removal Actions and Early Remedial Actions

4.1	Scoping
4.2	Limited Field Investigations
4.3	Preconceptual Design
4.4	EE/CA or FFS
4.5	Conceptual Design
4.6	Remedy Selection and Documentation

4.6.1 Non-Time-Critical Removal Actions

- Development of Preconceptual Design
- Definition of Contingency Plans
- Development of Monitoring Plans
- Preparation of Draft Action Memorandum

Background

During scoping, work begins on defining the alternatives, which is actually the earliest step of design. Because the likely overall approach and major features of the early action are fairly certain, starting work on defining the alternatives is possible during scoping and is a major opportunity for streamlining the decision and design support phase. Another advantage is that early work to explore some of the details of the action will often identify additional data needs that can be addressed through an LFI.

In this submodule, the preconceptual design of the alternative(s) is addressed. This effort is very similar to defining the alternatives in a comprehensive FS (see DOE's RI/FS guidance, Submodule 5.1); that is, the design is carried to approximately the same level of detail. This is not additional work being added to the early action process. All of the work to develop a preconceptual design of the alternative(s) will have to be completed to present the defined alternative(s) in the Engineering Evaluation/Cost Analysis (EE/CA) or Focused Feasibility Study (FFS). The work is simply moved forward in the process to the earliest point possible, to take advantage of the additional understanding that comes from the focused early action and to capitalize on the time savings (streamlining) inherent in doing each step of the process as early as reasonable.

The overall approach for the early action and many of the ancillary issues (e.g., ARARs, waste management, manageable uncertainties) were worked out at a preliminary level and were brought to consensus in the consensus memorandum. In preconceptual design, the early action evolves from a concept or vague idea to a fairly specific approach to remediation. Most of the smaller details will remain undecided, and any aspect of the approach is subject to change during the final design after the ROD or Action Memorandum is final. But all of the important features of the early action should be specified, and (in general) the action(s) should be presented such that any reader can clearly understand what is envisioned for the remediation.

The primary purposes in starting the preconceptual design during the scoping stage are:

- The essential implementability of the envisioned early action is confirmed through working out the major features of the action.

- Data needs are identified for the EE/CA or FFS and for the design.

- The preconceptual design of the alternative is the detailed formulation used to communicate the substance of the early action in its most concrete terms. It is useful for increasing understanding, within the extended project team, of the details and difficulties of the early action.

- The preconceptual design of the alternative(s) is the basis for the detailed evaluation in the EE/CA or FFS. It is incorporated directly as a chapter of the document.

Although preconceptual design of the alternative(s)at this point is similar to defining the alternatives in a comprehensive FS (this is the best model for what a preconceptual design should be), some differences do exist: (1) the preconceptual design may address issues, such as contracting strategy, that are not typically addressed in an FS; (2) the preconceptual design can be developed further than an alternative would generally be developed in an FS, because typically only one alternative is under consideration and the further work is less likely to be wasted effort; and (3) the preconceptual design of an early action is not an *example* of how the alternative might work in practice, but is the conceptual approach that will *be implemented* (allowing for some changes as the concept is refined, stakeholder imput is received, and the final decision is made).

In an EE/CA the alternative(s) will be analyzed in detail against three criteria:

Effectiveness
Implementability
cost

In an FS the alternative(s) will be analyzed against seven technical criteria:

Overall protectiveness of human health and the environment
Compliance with ARARs
Long-term effectiveness and permanence
Reduction of toxicity, mobility, and/or volume of wastes or contaminants through treatment
Short-term effectiveness
Implementability
cost

The preconceptual design of the alternatives must be detailed enough to support the detailed analysis of the alternative(s) against each of the relevant criteria, but may be carried further if appropriate. Assessing how far to carry the design effort at this point is primarily a matter of judgment. Two possibilities are:

- In most instances only one alternative, perhaps with minor variations, is considered after the consensus memorandum is developed. In this instance, the break between preconceptual design and conceptual design (See Submodule 4.5, Conceptual Design) is somewhat artificial, and the design can proceed directly into conceptual design. Other than pausing long enough to write up the description of the alternative that will be used in the EE/CA or FFS, the design effort may be able to proceed without pause.

- In some instances, it may have been possible in the consensus memorandum only to decide that an action will be pursued (because of the nature of the release or threat of a release), but not to determine the likely best course of action. In such instances, two (or in rare instances perhaps even three) alternatives may be under consideration, and it will not be profitable to carry the preconceptual design beyond the minimum required to meet the purposes of the EE/CA or FFS. After the detailed evaluation is completed for the EE/CA or FFS, the extended project team should be able to identify the likely best alternative. At that point, the design effort can resume with the preparation of the conceptual design (see Submodule 4.5. Conceptual Design).

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In this submodule, the essential minimum preconceptual design is described. Whether and how far to carry the design beyond what is specified here is a decision that must be made by the DOE project manager or designee.

Organization

Submodule 4.3 discusses the following:

- Development of preconceptual design
- Definition of contingency plans
- Development of monitoring plans

In addition, more detailed information is provided in the following note:

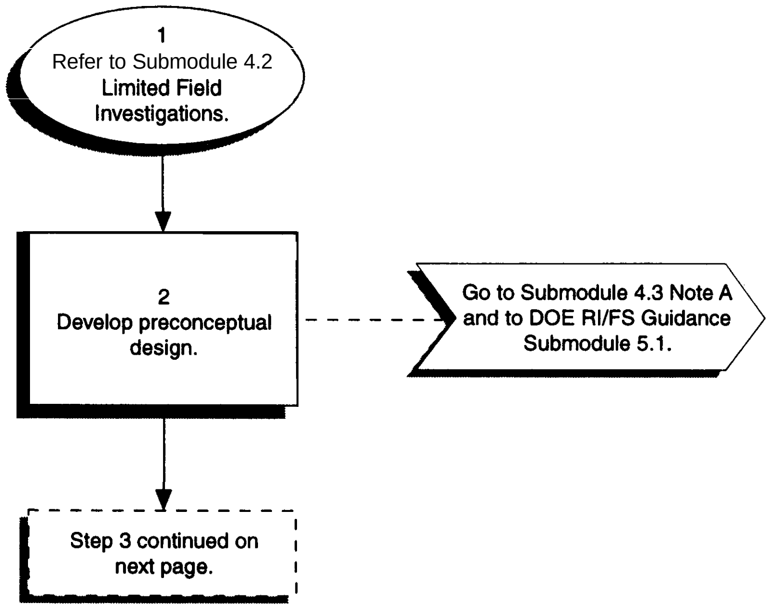
- Note A–Example Preconceptual Design

Sources

1. DOE, September 1994, *CERCLA Removal Actions, DOE/EH-0435.*

2. **40 CFR 300,** March 8, 1990, NationalOil and Hazardous Substances pollution Contingent plan, Federal Register, Vol. 55, No. 46 Rules and Regulations.

Submodule 4.3 Preconceptual Design



Step 1. Refer to Submodule 4.2, Limited Field Investigations. Also refer to Submodule 1.2, Development of a Consensus Memorandum, for an explanation of the level of detail used in describing the early action approach in the consensus memorandum. The further elaboration of that description into a preconceptual design is the subject of this submodule.

Step *2.* **Develop preconceptual design.** A complete design team will eventually be needed to develop the final design, The first members of the design team should be identified at this point and assigned responsibility to develop the preconceptual design. The composition of the team that will develop the preconceptual design is highly dependent on the remedial actions envisioned. At a minimum, the project engineer and lead design engineer should be identified. Together, these two individuals should be able to identify the types of expertise (e.g,, process engineer, construction engineer, modeler, hydrogeologist, soil chemist, engineering graphics) that will be needed to develop the preconceptual design. These personnel should be involved in all major planning meetings to provide key design data needs.

The primary purposes of preconceptual design are:

- Feasibility of the early action is confirmed. During development of the preconceptual design, the implementability, effectiveness, and cost (which constitute "feasibility" in the CERCLA context) are evaluated at an initial level of detail. Once the preconceptual design is completed, the essential feasibility of the envisioned approach should not be in question. If it is, either the problem is not a good candidate for early action, or the approach chosen for development is not a good alternative.

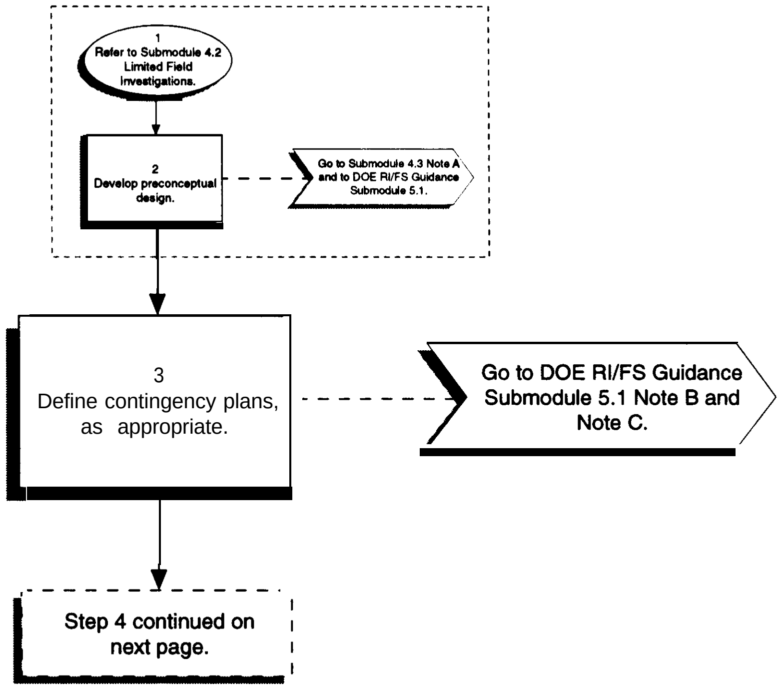
- Understanding of the envisioned action increases. The preconceptual design is the detailed formulation used to communicate the early action approach in its most concrete terms. As such, it is useful in increasing understanding of the details and difficulties of the early action within the extended project team and between technical staff (e.g., members of the design team).

- The preconceptual design serves as the basis for the detailed evaluation required in the EE/CA or FFS.

The preconceptual design must be specific enough to support evaluations against all of the applicable criteria (see the Background section of this submodule). To evaluate an alternative(s) against the criteria, details will be required about how the alternative(s) will be accomplished. For example, in order to assess whether a precipitation process can be designed to treat metals in contaminated water at certain levels (and to certain levels), completion of a preconceptual design of a feasible system will usually be necessary for exploring different process options and combinations of process options. In this process, the alternative becomes specific enough to make predictions about protectiveness, achieving ARARs, effectiveness, implementability, and cost.

Note that no matter how specific the preconceptual design of an alternative may become, any aspect of it may be modified through later stages of the design process. The preconceptual design does not determine, in a final sense, any aspect of the remediation.

Submodule 4.3 Preconceptual Design (cont.)



Only the Action Memorandum or the ROD determines the major features of the early action; the final design determines the details.

Because early steps of the design are being moved to an earlier stage in the process, developing the early action alternative(s) to a preconceptual design level requires more engineering time and resources than is usual in the scoping stage. Adequate funding must therefore be allowed for this step. Submodule 5.1 of DOE's RI/FS guidance provides examples that further explain the complexity and cost of defining (developing preconceptual designs of) alternatives.

The preconceptual design is developed to meet the expected site conditions, as reflected in the conceptual site model. The alternative(s) (and hence the preconceptual design) essentially assume that the expected conditions are the conditions that will be met in the field during implementation. (The possibility that different conditions will be found is addressed separately; see Step 3.) The preconceptual design of the alternative(s), as developed to meet the expected conditions, is the focus of the detailed analysis in the EE/CA or FFS. Any potential deviations from the expected conditions, the contingency plans to meet those deviations, and the implications (cost and other) of the contingency plans, are modifying factors that are also considered in the detailed analysis and in the decision making process for an early action.

Submodule 4.3, Note A provides an example of a "defined alternative" that is a good model for a preconceptual design of an early action. However, the example is more elaborate and detailed than would generally be necessary to support an early action.

Step 3. **Define contingency plans, as appropriate.** The two primary reasons for developing contingency plans are:

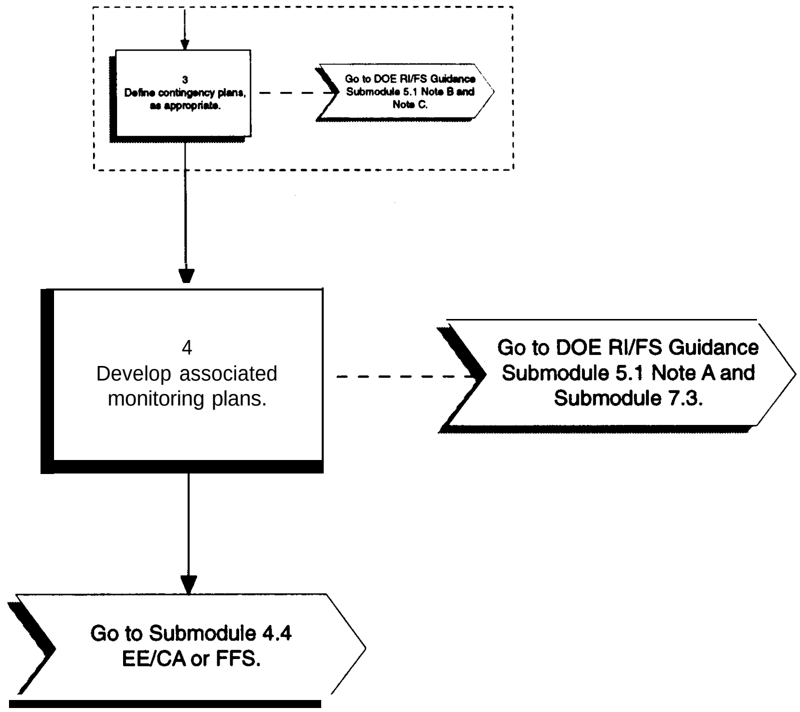
- To facilitate earlier cleanup by enabling remediation to begin even though some uncertainties remain about actual site conditions. When prepared with contingency plans for any foreseeable deviations of actual site conditions from the expected conditions, and with proper monitoring for such deviations, remediation can begin.

- To facilitate a more realistic bidding process by informing the prospective remediation contractor(s) of the potential deviations and of the responses that they will be expected to implement (i.e., contingency plans) for any deviation,

During the preconceptual design, the internal DOE project team (e.g., engineers, regulatory specialists, risk assessors) considers each of the reasonable deviations from the probable conditions and from their potential impacts on the alternative(s). The EE/CA or FFS should address every impact. Contingency plans are developed for any impacts that are significant. If no contingency plan is possible for meeting a potential deviation (i.e., it cannot be reasonably guaranteed to be a workable approach), the alternative is probably not a good approach for the early action and should be revised.

The contingency plans must be defined in sufficient detail to support the detailed evaluation in the EE/CA or FFS; but they do not have to be defined to the same level of

Submodule 4.3 Preconceptual Design (cont.)



detail as the alternatives. Contingency plans for an early action may be developed in greater detail at this stage in planning than they might be in a comprehensive FS.

The faster pace of an early action and the reduced range of alternatives being considered (usually only one) justifies a greater investment in planning for contingencies. Three considerations in defining each contingency plan are:

- Implementability – whether a modification of the alternative (i.e., a contingency plan) can be implemented and relied upon to work effectively.

- Protectiveness – whether the contingency plan will provide equal or greater protectiveness and achieve ARARs as effectively as the (base) alternative.

- Cost –the cost impacts of having to implement the contingency plan. Great accuracy in the cost estimate for the contingency plan is not the goal. The likelihood of the deviation presumably is low (otherwise, the deviation would be the expected condition) and the alternative probably will be implemented as in the design. But, the approximate cost impact must be known for consideration in the detailed evaluation.

Examples of contingency plans are provided in DOE's RI/FS guidance, Submodule 5.1, Notes B and C, and in Submodule 4.3, Note A of this guidance.

Step 4. **Develop associated monitoring plans.** The purposes of the monitoring plans are (1) to evaluate whether actual site conditions match expected site conditions and (2) to evaluate technology performance. Primary indicators of conditions and performance are selected for observation. Expected values for these parameters are established for the expected conditions and expected technology performance, as well as for the potential deviations. These expected values are then used to determine when a deviation has been encountered or when a technology has failed.

A monitoring plan should be developed for each potential deviation that could affect implementation of the alternative(s). The monitoring plans are one of the most important aspects of the alternative(s) and should be defined to the same level as the alternative(s). This is necessary for two reasons: (1) the monitoring plans will *be* implemented (unlike a contingency plan, which only *may* be implemented) and relied upon for the selected alternative; and (2) the cost impacts of the monitoring plans must be known so that they can be included in the order-of-magnitude cost estimate for the alternative.

DOE's RI/FS guidance, Submodule 5.1, Note A includes an example monitoring plan; Submodule 7.3 of that guidance provides additional information on monitoring plans. Submodule 4.3, Note A of this guidance provides an example of a monitoring plan in a preconceptual design.

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Note A.

Example Preconceptual Design. This example preconceptual design is for an early action at the Weldon Spring Site. It is an example of the level of detail at which an action should be worked out during preconceptual design. The level of detail is similar to the level of detail appropriate for a "defined" alternative in a CERCLA FS (see DOE's RI/FS guidance, Submodule 5.1). But, it is important to point out that the level of detail in this example is more likely to be appropriate to an interim remedial action than to a non-time-critical removal or an early remedial action. Interim remedial actions can be used for site problems of any level of complexity and for actions costing millions of dollars; careful definition of the alternative is appropriate for an action that substantial.

The following details should be noted from this example.

- The level of definition is much greater than required simply to communicate the essentials of the alternative to the extended project team and stakeholders. In addition to communicating essential features, the level of definition has to be sufficient: (1) to allow regulatory specialists and regulatory agency personnel to determine the likelihood of achieving any ARARs that will not be waived for implementation of the early action; and (2) to allow risk assessors to determine the likelihood of achieving human health and environmental protectiveness through implementation of the early action.

- The alternative has to be resolved in sufficient detail such that an engineer can predict with reasonable assurance the implementability, effectiveness, and reliability of the alternative, if implemented as envisioned and if the expected conditions are actually met in the field.

- The alternative has to include identification of uncertainties, potential deviations, contingency plans, and monitoring plans.

- The level of definition has to be sufficient to allow a cost engineer to identify all major cost elements in the following categories:

  design
  permitting
  procurement
  bonding
  insurance
  legal services
  rent (office and work space)
  labor
  materials
  travel
  equipment (purchase and rental)
  special equipment that will have to be fabricated (e.g., treatment systems)

specialty subcontractors
mobilization
utilities
site access
relocation of affected population
land acquisition and site development
utility relocation
buildings
site security
health and safety
services during construction
sampling and analysis (e.g., compliance, health and safety, investigation during remediation, fugitive emissions monitoring and control)
monitoring for deviations and effectiveness (monitoring plan)
decontamination
management of wastes
reports during remediation
community relations during remediation
management of treatment residuals
transportation
demobilization
startup
operation and maintenance
contingencies
profit (contractors)

Weldon Spring Site Remedial Action Project Quarry
Preliminary Engineering Report
January 1990

1.0 Introduction

1.1 Purpose of Report

The purpose of this report is to provide a framework for conceptual design and to support the environmental compliance process for the removal of approximately 95,000 cubic yards (cy) (DOE, 1987) of radiologically and chemically contaminated waste from the Weldon Spring quarry to a temporary storage area at the Weldon Spring chemical plant area. The waste consists of steel drums, structural steel and concrete rubble, machinery, sludges and soil.

Scope of the action.

The report describes the various processes and facilities that are necessary for waste removal, transport, and storage; the criteria to be used in design; and measures necessary to ensure compliance with applicable environmental safety and health standards and guidelines.

1.2 Background and General Description of Work

The Weldon Spring quarry was excavated prior to 1942. The limestone mined from the quarry was used for the construction of the Weldon Spring Ordnance Works.

Between 1942 and 1945 the quarry was used by the Army for disposal of residues generated by the Ordnance Works. After that it was used until 1957 as a disposal site for rubble that had been contaminated with trinitrotoluene (TNT) and other nitroaromatic compounds.

Site history.

In 1958 the U.S. Atomic Energy Commission (AEC) assumed custody of the quarry and used it as a disposal site for chemically and radioactively contaminated wastes generated by the Weldon Spring Chemical Plant, built on the site of the Ordnance Works and operated until 1969. The wastes dumped into the quarry included drummed waste, uncontained waste, building rubble, and contaminated process equipment.

The U.S. Department of Energy (DOE) proposes to remove the contaminated wastes from the quarry to a temporary storage area within the chemical plant area as a part of the Weldon Spring Site Remedial Action Project (WSSRAP). Final disposition of the Quarry wastes will be addressed in the Weldon Spring Chemical Plant Record of Decision.

The work covered in this report involves the excavation of the contaminated wastes from the quarry pit and their handling, transportation, segregation and storage in a temporary storage area at the chemical plant area.

Scope of the action.

1.3 Location of Work

The work to be performed is located at the Weldon Spring Site which is near Weldon Spring, Missouri, about 30 miles west of St. Louis (see Figure 1.1). The Weldon Spring Site consists of two non-contiguous areas, namely, (1) the chemical plant and raffinate pits area and (2) the quarry. The quarry is about 4 miles south-southwest from the chemical plant area and is accessible by State Highway 94.

1.4 Report Organization

This report is organized to provide the reader with an understanding of the design and construction sequence for accomplishing the removal of contaminated waste from the quarry. The report addresses various alternatives for accomplishing the work; selects a preferred design approach; and identifies problems, concerns or uncertainties that will be considered before the final design and construction,

Based on the above approach, the main topics of this report are presented in the following order:

- Introduction
- Bulk Waste Excavation
- Bulk Waste Hauling
- Bulk Waste Segregation and Temporary Storage
- Proposed Method of Accomplishment
- References
- Appendices

2.0 Bulk Waste Excavation

2.1 Site Description

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2.2 Site Preparation

2.2.1 Temporary Facilities

The excavation subcontractor will set up trailers outside the restricted area for supervisory, office, and health and safety personnel. Temporary facilities to be provided by the subcontractor include personnel trailers, and portable restrooms. The subcontractor will set up the parts trailer, equipment repair trailer and fueling facilities within the restricted area.

Subcontractor-provided facilities.

It is anticipated that periodic washdown of the subcontractor's excavation equipment will be necessary. Facilities will be established to accomplish this within the excavation area. Drainage ditches will be designed to drain to the quarry pond. Smaller equipment will be washed at a decontamination pad that will be provided by the Government at the quarry staging area.

2.2.2 **Clearing and Grubbing**

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2.3 **Excavation**

2.3.1 **General**

Probable conditions.

The bulk waste material has been deposited entirely within the confines of the quarry. The quarry walls are primarily Kimmswick limestone. The deepest portion of the original quarry floor was excavated about 15 feet into the underlying Decorah Formation, which consists of shale and limestone layers. Therefore, some of the quarry floor is in the Decorah Formation while the remainder of the benches are in the Kimmswick limestone. Joints within the Kimmswick are vertical with apertures varying from about one inch to several feet. Clay fillings are present in many of the joints.

As the bulk excavation material is removed, initial cleanup of the walls will be limited to scraping by the excavation equipment. High pressure washing of the walls will then be utilized to remove visible loose material not removed by the equipment.

Approach.

The floor of the quarry will be trenched to promote drainage to a dewatering facility set up at the quarry pond. It is anticipated that the drainage trenches can be excavated without blasting by using a small backhoe in the shales and limestone benches. Drainage across open fractures on the quarry floor will be controlled by providing quick-setting impervious grout bridges in the fractured areas so that the quarry drainage can be directed to the dewatering sump. All loose material on the quarry floor that can be removed using conventional equipment will be removed. There will be some manual work performed to remove loose material from cracks and crevices.

Probable conditions.

The quarry walls are believed to be stable. However, a portion of the northern wall could be of marginal stability.

Monitoring for reasonable deviation to probable conditions.

Stabilization could be accomplished with rock bolts, wire mesh and shotcrete. The high walls will be inspected during waste removal in order to verify stability. Any costs for wall stabilization will be covered as a deviation and addressed via the observational method to be described in the Conceptual Design Document (see Section 2.3 .2).

The material to be removed has been briefly described under Section 2.1. The majority of the waste material will be fine-grained soils, rock and rubble. Table 2.1 shows the approximate dates of the waste disposal, the classification of the waste, and the estimated quantity where known. Figure 2.3 shows the zones of radiological contamination at the fenced quarry area. Figure 2.4 shows the sampling locations and chemical constituents detected at the quarry, and Figure 2.5 shows the area of relatively high concentrations of surficial nitroaromatic contamination. Preliminary sorting of ‘wastes, including a rough washdown of metal and structural wastes, will be done at the quarry site as space and logistics permit. After transport to the temporary storage area at the chemical plant, the material will be segregated into piles according to the following categories:

Remediation approach.

A - Rock and concrete rubble
B - Fine-grained soils
C - Sludge
D - Nitroaromatic-contaminated soils
E - Structural debris (such as metal shapes, plates, and piping)
F - Drummed waste containers
G - Equipment and process vessels
H - Cleared and grubbed materials.

The nitroaromatics taken from the east end of the quarry (Figure 2.5) will be kept segregated during excavation, hauling and temporary storage.

Rough estimates of the quantities for the various categories in the temporary storage area are included in Section 4. Table 2.2 summarizes the volume of radiologically contaminated material in zones shown on Figure 2.3. The total volume of 83,200 cy agrees favorably with an earlier estimate of 95,000 cy which included a 9,000 cy contingency (DOE 1987). Potential variations in volumes of each waste type will be factored into the temporary storage area design.

2.3.2 Observational Method

Approach for managing uncertainty.

An observational design approach, as described below, will be utilized for the quarry bulk waste removal project. The observational method provides for a structured approach to managing uncertainty, whereby planning is based on available data and realistic assumptions of field conditions. Reasonably conceivable deviations to those conditions, and mechanisms by which to identify their occurrence are defined, and plans to address or mitigate adverse effects as a result of the deviations are developed. The planning and design for unfavorable conditions will be addressed in a Conceptual Design Document (CDD). The CDD will expand on the information presented in this document. The additional cost and schedule for unfavorable conditions will be carried as separate cost items in the CDD estimate.

First design deliverable.

The initial design will assume that waste will be adequately dewatered so that a single-pass excavation can be performed safely regarding the environment,

Table 2.1
Waste Disposal at the Weldon Spring Quarry[a]

Date	Material	Quantity
1942-1945	NITROAROMATICS AND RESIDUES Quarry used for disposal of TNT/DNT wastes.	50,000 Cy Unknown
1946	NITROAROMATICS AND RESIDUES Quarry used for disposal of TNT/DNT wastes.	90 tons
1946-1957	TNT RESIDUES Residues and rubble dumped in deepest part of quarry and in northeast corner.	Unknown
1959	THORIUM RESIDUES Drums containing 3.8% thorium dumped. Currently below water level. Contains Ra-228 content of 1/4 curie.	185 cy
Early 60s	BUILDING RUBBLE, EQUIPMENT, SOILS Demolition rubble from Mallinckrodt Destrehan Street Plant. Covers approximately one acre to 30 ft deep in the deepest part of the quarry. Contains uranium and radium contamination with 1 curie Ra-226.	50,000 Cy
1963-1965	THORIUM AND URANIUM RESIDUES Several thousand drums containing thorium and rare earths from Granite City Arsenal. Initially intended for disposal. Much of waste later removed for reprocessing.	Unknown
1966	THORIUM RESIDUES Drums and residues from shutdown and cleanup of Weldon Spring Chemical Plant process equipment,	Unknown
1966	THORIUM RESIDUES Hundreds of drums brought from Cincinnati by rail. Contain 3 % thorium with estimated 1 curie Ra-228. Placed above water level.	555 cy
1966	TNT/DNT RESIDUES Contaminated stone and earth dumped in northeast corner of quarry covering the Cincinnati thorium residues.	Unknown
1968-1969	URANIUM AND THORIUM RESIDUES Contaminated building rubble and process equipment from Weldon Spring Chemical Plant. Principal sources of radioactivity are Ra-226 and Ra-228.	5,555 Cy

[a]Source: Table 4.1 of MKF & JEG, 1989a.

operating personnel, and equipment. Possible deviations to the plan that will be addressed by the observational method described in the CDD include:

Reasonable deviations.

Table 2.2
Weldon Spring Quarry Summary of Estimated Areas and Volumes of Radiological Contamination at the Weldon Spring Quarry[a]

Zone[b]	**Area (Sf)**	**Volume (cy)**
Haulway	48,300	6,600
Sump[c]	58,900	55,100
Northeast Comer	52,800	21,300
Rim	11,000	200
Total	**171,000**	**83,200**

[a]Source: MKF & JEG, 1989a.
[b]See Figure 2.3 for zones.
[c]Includes 4,100 cy of sediment in pond.

a) Additional dewatering requirements.

b) Greater concentration of radon or chemical contamination than estimated.

c) Higher level of protection required for personnel as a result of item (b).

d) Greater time required to perform the work as a result of items (a), (b), and (c).

e) Increased cost and schedule due to the inability to adequately dewater the material.

f) Stability of quarry walls.

2.3.3 **Safety and Health Protection Measures**

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2.3.4 Radon and Radon Daughter Product Control

2.3.4.1 Radon and Radon Daughter Product Monitoring

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2.3.4.2 **Engineering Controls** • • • **2.3.5 Equipment** Approximately 90 percent of the excavation will be located in cuts varying from 10 feet to 40 feet in depth. The material is heterogeneous and may vary in densities from 3000 to 4400 pounds per cubic yard. A backhoe capable of excavating the waste material in a single pass is desirable if the dewatering system for the quarry pond and the surrounding groundwater system is successful in lowering the water level substantially to the quarry floor. A large hydraulic backhoe excavator meets the requirements of removing the deepest fills of 40 feet by means of a 61-foot hoe reach, sufficient power and a large bucket. Figure 2.6 illustrates application of this equipment for this alternative - Alternative 1.	**Methods and means that may prove acceptable.**
Two additional dewatering wells, located as shown on Figure 2.6 and designated as wells nos. 2 and 3, will improve the effectiveness of the dewatering system to allow implementation of this alternative.	**Scope.**
If the water table is only partially lowered, then a second alternative using a two or more stage excavation program will be required. The large long-reach backhoe would not be needed, but something with less reach and less power could be employed. Lifts of approximately 20 feet maximum could be excavated by means of a hydraulic backhoe excavator equipped with a hoe capable of digging to 35 feet, as shown in Figure 2.7. As a third alternative, in the event dewatering is unsuccessful, a dragline approach as shown in Figure 2.8 would be used. The equipment would work the face in one pass to the full depth, but remain approximately 90 feet back from the toe of the face. A dragline excavator equipped with a 125-foot boom and a 5-cy bucket would meet the requirements for the task. • • • The excavated waste would be cast directly behind the excavator in each case, where more room would be available for gross sorting and loading on the haul trucks.	**Contingency plans.**
Two front-end loaders of 3 to 5 cy capacity will be used for sorting, a 5 cy front-end loader for truck loading, and a hydraulic crane of 10 to 15 ton capacity will be used for removing, stacking, and loading out structural plates and shapes. Also as shown on Figure 2.6, there would be a bulldozer working on the quarry floor for feeding waste to the backhoe. The trucks used for hauling are discussed in Section 3.	**Methods and means.**

Support equipment for the excavation equipment will include a motor grader for maintaining drainage ditches and a 3500-gallon water truck for haul roads within the quarry area. Water supply to the excavation area will also be required to provide spray water for dust control and for sluicing quarry walls.

Trenches will be constructed on the quarry floor to facilitate drainage towards the dewatering pump.

2.3.6 **Weather**

This geographic area receives an average of approximately 36.5 inches of precipitation per year, with 50 percent of the precipitation usually occurring from April through August. Wind speeds up to 60 miles per hour (mph) have been recorded in the area. Temperature extremes range from about minus 100 F to near 115 “F. During summer, worker heat stress due to high humidity and high temperature must be taken into consideration when evaluating construction activities. Excavation from October through March may be delayed due to freezing conditions suspending operations. However, it is assumed that operations will be continued year-round, considering appropriate weather delays.

Probable conditions.

2.3.7 **Excavation Scenario**

The performance of the bulk waste removal operation will depend on the effectiveness of the dewatering system, the type of excavation and hauling equipment furnished by the subcontractor, the plan for sequence of removal and sorting of the waste materials and, finally, the safety and health provisions that will be in force while the operation proceeds.

Excavation approach.

The type of equipment suitable for excavating the waste has been discussed under Section 2.3.5 and will depend in part on the dewatering effectiveness. An alternate dewatering method is shown on Figure 2.9. This scheme takes advantage of the stability of the limestone quarry walls. A dewatering trench from the pond pumping system would be excavated along the limestone pyramid wall, assumed to have been quarried at a slope of 0.5H: IV or 0.25H: lV. The trench would be excavated adjacent to the wall up to about Station 4+50. The slope of the trench wall on the waste side would probably stabilize at about 1.5H: IV. The advantage of this dewatering scheme is that it opens up a face for drainage of 150 feet through the major part of the excavation.

Figure 2.6 also illustrates a three-phase method for excavation.

Phase 1 excavation would commence from the northeast comer at approximately Station 10+00 and work down the slope to Station 6+25. The cuts are mostly 10 feet deep or under except for the 25-foot depth between Station 8+50 and 9+00. The estimated quantity of waste to be removed in Phase 1 is approximately 21,300 cy. Groundwater should be of minor concern in Phase 1 as the quarry floor slopes rapidly towards the deepest part of the quarry.

Details necessary to convey exact scope of intended effort.

Phase 2 of the excavation would commence from the side of the present quarry pond site with completion at approximately Station 5+OO. Phase2 accounts for nearly 65% of the waste. There should be adequate room behind the excavation face to permit temporary stockpiling of wastes, preliminary sorting with 4 cy front-end loaders, and loading into trucks with the 5-1/2 cy front-end loader. One-way haul roads entering and leaving the restricted area are recommended for traffic control, Phase 3 would be the final phase as the excavation progresses from Station 6+25 to the quarry fence on the west.	
Maintenance of site drainage and truck access to the sorting pile will require periodic use of a motor grader, Laborers will be required to maintain traffic in and out of the pit area and to maintain drainage ditches and culverts.	
2.4 **Interstitial Water**	
In general, drainage at the face of the excavation and along the floor of the quarry will promote the maximum amount of drainage. If the material will not drain or drains too slowly, the material may be stockpiled within the area for drying and hauling later. See Section 3.1, Hauling Methods and Precautions.	**Contingency plans.**
2.5 **Potential Problems and Uncertainties Related to Excavation**	
The primary cost concern is the extent of the unknown conditions that will be encountered when removing the heterogeneous waste material. Protective clothing, respiratory equipment, air monitoring, and safe work practices will be used to minimize or control contaminant exposures. Any cracks or crevices under the wastes will require controls to assure that drainage water does not move into the openings, carrying contamination beyond the quarry limits.	**Reasonable deviations.**
Provisions for adequate safety of personnel in the excavation area will reduce productivity and increase cost.	
The equipment selected should, under normal conditions of work, excavate from 300 to 450 cy of material per hour. This rate was reduced to 65 cy per hour to allow for the difficulties of excavating, sorting, and reloading the contaminated material into trucks, including rotation of personnel at the sorting pile and working face due to worker heat stress problems during warm weather periods. Work stoppage for data collection is another factor that will reduce the excavation rate.	**Performance factor.**
It is also possible that the excavation equipment may become contaminated to the extent that it must be retained on site and a fair appraisal price be negotiated with the excavation subcontractor. The excavation equipment will be appraised prior to mobilization of the equipment, and establishment of fair values with the selected subcontractor made prior to award of the contract.	**Contracting issue.**
The likelihood of the purchase of the subcontractor's excavation equipment will be minimized by the enforcement of periodic washdowns of the equipment.	

3.0 Bulk Waste Hauling	
3.1 Hauling Methods and Precautions • • •	
3.2 Haul Road • • •	
3.2.1 Haul Road Construction • • •	
3.2.2 Surface Water Drainage • • •	
3.2.3 Dust Control • • •	
3.2.4 Decommissioning • • •	
3.3 Haul Road Traffic	
Haul road traffic will consist principally of 10 to 15 cy capacity haul trucks. The maximum anticipated traffic frequency is one truck approximately every 10 minutes. For cost estimating purposes, the haul traffic is assumed to operate on a schedule of five days per week, eight hours per day, and will require at least eight months to transport all quarry waste material.	**Assumptions.**
All haul trucks will be surveyed after being decontaminated but prior to entering the haul road or crossing Highway 94. A decontamination pad will be provided at the quarry in conjunction with bulk waste excavation and decontamination at the chemical plant will occur at an existing facility.	**Available facilities.**

Decontamination will consist primarily of washing down the haul trucks with high pressure and/or low pressure water systems. Additional measures such as self-contained hot water/steam systems will be used if necessary. All sediment and wash water runoff will be collected. Decontamination pads will be regularly washed down to clean up mud and dust and to prevent carryout by wheels. All contaminated water will be collected and treated; all collected sediment will be disposed of in the temporary storage area. All trucks will be surveyed for radioactive contamination prior to leaving the quarry and chemical plant areas. 3.4 **Accidents, Bulk Waste Spills, and Emergencies** • • • **3.4.1 Public Traffic Volume/Haul Traffic Volume** • • • **3.4.2 Equipment Failure** • • • **3.4.3 Human Error** • • • **3.4.4 Road and Weather Conditions** • • •	**Wastewater management.**
4.0 Bulk Waste Segregation and Temporary Storage **4.1 Temporary Storage Area Description** **The** temporary storage area will provide facilities for storing contaminated bulk waste material removed from the quarry until it can be placed in a	**Waste management.**

permanent depository. The TSA will not redesigned for and will not be a permanent depository. Removal of wastes to a permanent facility will occur within ten years. Design criteria for the TSA are shown on Table 4.1.

Table 4.1
Temporary Storage Area Design Criteria

Location Requirements

- Place 10 ft above the historical high water table
- Locate above the 100 year floodplain

Liner Requirements

- Design, construct, and install to prevent any migration of wastes to the surrounding environment
- Constructed of materials having appropriate chemical properties and sufficient thickness to prevent failure due to:
  - Pressure gradients (static head and external hydrogeologic forces)
  - Physical contact with the waste or Ieachate
  - Climatic conditions
  - Installation stress
  - Daily operation stress
  - Uneven loads
- Install to cover all surrounding earth expected to come in contact with the waste
- Having sufficient thickness to prevent migration
- Sustain integrity for a design life of 20 years
- Having a maximum permeability of 1×10^{7} cm/sec

Leachate/Runoff Collection Systems (LRCS)

- Design to contain a water volume resulting from a 25-year, 24-hr storm
- Allow no less than one foot of freeboard in the retention ponds
- Ponds will consist of a double liner and a Ieachate collection system
- Construct of materials that are
  - Chemically resistant to the waste
  - Of sufficient strength and thickness to prevent collapse under the pressures exerted by the overlying wastes, waste cover materials, and operational equipment
- Design and operate to function without clogging through the design life of 20 years

Runon Control System

- Prevent flow onto the active portion of the facility during peak discharge from a 25-year storm

Cover Requirements

- Minimize moisture infiltration
- Prevent wind dispersion of particulate matter during operations and closure
- Concentration of radon 222 shall not exceed:
  - 100 pCi/L at any point
  - An annual average of 30 pCi/L over the facility
  - An annual average of 3 pCi/L at the facility perimeter
- Provide proper drainage to the LRCS

Design criteria.

The TSA will be located near the southwest corner of the chemical plant site (Figure 4.1) so it will be close to the haul road. As previously stated, the Weldon Spring quarry is estimated to contain approximately 95,000 cy of heterogeneous in-place materials including contaminated soil, concrete, steel, drums, building materials, and miscellaneous equipment. The materials will be characterized at the TSA, but preliminary sorting based on visual inspection will be accomplished at the quarry as space and logistics permit during excavating and sorting operations. This process includes determining the quantity of solids or liquids remaining in buried drums in the quarry and determining the condition of the drums. Drums that are encountered intact will be overpacked at the quarry for characterization at the chemical Plant site.	**Storage approach.**
The TSA, covering approximately 13 acres, will be designed to store approximately 140,000 cy of excavated material, which includes all quarry bulk waste material and all contaminated materials from the quarry construction staging area. The design volume will accommodate variations in the quantities of contaminated materials due to swelling of excavated material and provides some allowance for over-excavation that may occur. A contingency of at least 15 percent (based on engineering judgment) has been allowed in each sorting catego~. This excess capacity will provide flexibility in the sorting and temporary storing of materials as they are further characterized. Should the quantity of a given category exceed the contingency, excess material would be stored with a different category, separated by geotextile fabric. All wastes will be managed in accordance with the Waste Management Plan (MKF and JEG, July 1989b).	**Reasonable deviation.**
Contaminated materials will be transported to the TSA by haul trucks on a haul road entering at the southern end of the chemical plant site near the railroad easement. The haul trucks will proceed to the TSA receiving/sorting area to discharge contents (see Figure 4.2, Section 4.3) for sorting prior to placement in the storage area. All haul trucks will then be cleaned at a nearby vehicle decontamination pad before exiting the chemical plant site. The receiving/sorting area will be a reinforced concrete pad suitable for haul trucks and front-end loaders. The storage area will have separate sub-areas for materials based on their physical or chemical characteristics. It may be advantageous to cover the unloading/sorting area with a building if significant dust control efforts are required. A structure could be made available as a contingency measure under the observational approach. Cost for such a structure would be included in the CDD estimates.	**Contingency Plans.**
All stormwater runoff and leachate from the TSA will drain by ditches and swales to collection ponds within the TSA. The stormwater runoff and drainage system will be designed for a 25-year, 24-hour storm (approximately 5.67 inches of rainfall in 24 hours). These collection ponds will be sized to accommodate the design storm with one foot of freeboard provided. The design will also include a double liner and a leachate collection system.	**Reasonable deviations.** **Design criteria.**
Design flow rates of the run-on control system will be based on a 25-year storm event with a minimum time of concentration of 2.5 minutes. Erosion protection of ditches will normally be limited to grass lining. Diversion	**Design criteria.**

ditches will reutilized to route surface water away from the TSA (see Section 4.1.2, Environmental Concerns).	
The TSA pad and liner will be of sufficient strength and thickness to prevent failure due to uneven loads, physical contact with the waste or leachate, climatic conditions, stress of installation, stress of daily operation, or the stress of loading material on and off of the storage area. It will be placed on a foundation capable of providing support to the liner and resistance to uneven loads above and below the liner due to settlement, compression, or uplift. A geotechnical characterization program will form the basis for defining specific construction practices to ensure that the design criteria are met. The waste storage area's base pad will accommodate the anticipated live and dead loads with consideration for long-term settlement.	**Performance standard.** **Design studies.**
The pad will consist of asphalt concrete surfacing underlain by a compacted aggregate base course over a 12-inch minimum thickness of recompacted in-place clay having a maximum permeability of 10^{-7} cm/sec or equivalent.	
The design life of the drainage facilities and pavements will be ten years of operation. During this period these facilities will be maintained in order to protect the environment.	
Although the TSA is currently designed for an operational life of 10 years, extending the design life could be accomplished if the following factors are assured:	
• The 12-inch compacted clay liner is adequate for additional life. • The asphaltic concrete base is designed as a working surface. Access ways need to be maintained throughout the life of the TSA. • Wastes subject to dispersion will be covered with liners. Additional cover may be needed over the liners to protect against long-term weathering and exposure. • Standard monitoring and maintenance procedures including liner inspection and repair should continue along with regrading the aggregate surfaced perimeter road.	**Potential methods and means to be considered by the design team.**
4.1.1 **Construction of the Temporary Storage Area** • • •	

4.1.2 Environmental Concerns Environmental safety is a prime consideration in the design of the TSA, since the facility will be storing contaminated material. The primary means by which contamination could spread is by surface water runoff/run-on, groundwater infiltration/percolation and wind. Good engineering practices will be implemented to prevent and/or mitigate the spread of chemical and radiological contamination. During its period of operation, the TSA will satisfy the substantive requirements of applicable regulations and of this document.	**Performance standard.**
A surface water runoff collection system will direct all runoff into retention basins to avoid the spreading of contamination to natural surface water, soil and groundwater. The retention basins will be lined with compacted clay and flexible membrane. Surface water run-on will be controlled by the use of diversion ditches to prevent contamination of clean surface water. The diversion ditches will be grassed waterways. Other applicable erosion control measures will be taken to ensure segregation of surface water runoff and run-on (contaminated vs non-contaminated).	**Thickness and other specifications left to design team.**
Potential contamination due to infiltration into the groundwater will be minimized by the underlying liner. Minimizing negative impacts on air quality during the storage of materials is another objective. Wind-blown particulate from the fine-grained materials storage area will be controlled through dust suppression methods. Periodic spraying with water and/or dust suppressants will be used to control windblown matter while the pile is being constructed. When a section of the pile is completed, a more permanent control measure, such as placing a flexible membrane over the fine grained materials, will be used. As mentioned in Section 4.1.1, Construction of the Temporary Storage Area, all erosion control measures will be specified in the CDD. 4.1.3 **Radon Gas Control** • • • **4.1.4 Decommissioning of the Temporary Storage Area** • • • **4.2 Criteria for Bulk Waste Segregation** • • •	

4.3 Segregation and Handling Techniques

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4.4 Operation and Maintenance of Temporary Storage Area

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4.5 Potential Problems and Uncertainties Related to Temporary Waste Storage

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5.0 Proposed Method of Accomplishment

5.1 Subcontract Packages

Contracting approach.

The removal of bulk waste from the quarry to the TSA is currently planned to be accomplished utilizing three separate subcontract packages as described below.

5.1.1 Haul Road Construction

This subcontractor will construct a haulroad from the quarry to the temporary storage area at the chemical plant site.

5.1.2 Temporary Storage Area Construction

This subcontractor will construct the temporary storage area at the chemical plant. The temporary storage area will be a large asphalt-paved area with asphalt berms and ditches for stormwater runoff and leachate collection.

5.1.3 Bulk Waste Excavation

This subcontractor will be responsible for the following activities: clearing and grubbing of the area within the fenced quarry area; any dewatering which may be necessary in addition to the pumping of the quarry pond; excavation of the bulk wastes, preliminary sorting at the quarry, and hauling to the temporary storage area at the chemical plant; maintenance of the haul road; and operation and maintenance of the temporary storage area during this period including additional sorting as may be required.

5.2 Cost Estimates

5.2.1 Basis of Estimates

Preliminary cost estimates have been prepared for the temporary storage area, haul road, and bulk waste excavation in accordance with preliminary sketches and drawings. Considering the preliminary status of the available sketches and drawings and the nature of the work, a contingency allowance of at least 30 percent should be considered for budget purposes.

Additional detailed backup for cost estimates should be available to support the estimates given here.

The labor rates used in these estimates are the Davis-Bacon rates for St. Charles County, Missouri effective April 1988. The equipment rates used in the estimates are based on general industry standards and include repair and service labor but not operating labor.
The following allowances have been added to the direct costs:

- Small tools and supplies -7 percent of Labor
- General expense and overhead -25 percent of Labor, Permanent Materials, Equipment, Supplies and Subcontractors
- Profit -10 percent of Labor, Permanent Materials, Equipment, Supplies and Subcontractors
- Hazardous Waste Insurance Surcharge -20 percent of Total Direct & Indirect Cost
- Equipment Surcharge - 15 percent for Filtered Air Ventilation System

5.2.2 Project Durations and Cost Estimates

An estimated range of individual project durations and costs are shown below. The durations of the projects are dependent upon the methods used by the subcontractors and available funding.

	Duration (weeks)	cost W$)
Temporary Storage Area	12	1.4- 1.8[a]
Haul Road	16	0.7-0.9’
Bulk Waste Excavation	36-65	2.9- 6.7[a]

[a]Includes 30% contingency allowance.

Submodule 4.4 Engineering Evaluation/Cost Analysis or Focused Feasibility Study

Non-Time-Critical Removal Actions and Early Remedial Actions

- 4.1 Scoping
- 4.2 Limited Field Investigations
- 4.3 Preconceptual Design
- **4.4 EE/CA or FFS**
- 4.5 Conceptual Design
- 4.6 Remedy Selection and Documentation

4.4.1 Engineering Evaluation /Cost Analysis

4.4.2 Focused Feasibility Study

Background

An EE/CA is written for a non-time-critical removal and an FFS is written for an early or interim remedial action. The purposes of an EE/CA or an FFS report are similar, even if their format is somewhat different. The similar purposes of the documents are:

- To identify a threat and thus establish the need for an early action
- To summarize the characterization of the site as related to the action alternative(s)
- To establish the objectives of the early action
- To describe the alternative(s)
- To analyze the alternative(s) against established criteria

Minor format differences of the documents are:

- The EE/CA is multi-purpose, presenting the results of the removal site evaluation including results of the LFI if conducted; an FFS generally does not present the results of the LFI (a separate technical memorandum or report would be used).

- An EE/CA analyzes the alternative(s) against only three removal action criteria– (1) effectiveness, (2) implementability, and (3) cost. An FFS analyzes the alternative(s) against the first seven criteria in the NCP, which are required considerations for remedial actions.

- An EE/CA includes a recommendation of a particular removal alternative. An FFS does not include a recommendation (although it may evaluate as few as one alternative); that function is served by the separate Proposed Plan.

- The outlines and contents of the two reports are somewhat different.

The EE/CA or FFS is kept as brief and efficient as possible regardless of the type of early action being considered. This is possible, in part, because an early action process does not begin with a question about the possible need for action; it begins with a conclusion that action is required and, usually, a presumption about the necessary nature of the action.

However, EE/CAs and FFSS have often been much longer than required. Many **EE/CAS and FFSS have** been virtually indistinguishable from comprehensive FSS, thus forfeiting much opportunity for streamlining the study phase and the review of the results. As with an early action work plan, no firm guidance can be given (some site problems are truly complex); however, limiting FFSS and EE/CAs to fewer than 100 pages (including tables and figures) should be possible for most early actions.

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Organization

Submodule 4.4.1, EE/CA Development and Submodule 4.4.2, FFS Development discuss the following:

- Statement of site problem(s)
- Reviewing and finalizing remediation objectives
- Defining alternative(s) for analysis
- Analysis of alternative(s)
- Developing EE/CA or FFS

In addition, more detailed information is provided in the following notes:

- Note A – Example EE/CA Format
- Note B – Example FFS Report Format

Sources

1. U.S. EPA, August 1993(b), *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCA, EPA/540/R-93/057,* OSWER Directive 9360.0-32.

2. DOE, December 1993, *Remedial Investigation/Feasibility Study (MIFS) Process, Elements, and Techniques Guidance, DOEIEH-94007658.*

3. DOE, September 1994, *CERCM Removal Actions, DOEIEH-0435.*

4. 40 CFR 300, March 8, 1990, *National Oil and Hazardous Substances Pollution Contingency Plan,* Federal Register, Vol. 55, No. 46 Rules and Regulations.

Submodule 4.4.1 Engineering Evaluation/Cost Analysis

Non-Time-Critical Removal Actions and Early Remedial Actions

- 4.1 Scoping
- 4.2 Limited Field Investigations
- 4.3 Preconceptual Design
- **4.4 EE/CA or FFS**
- 4.5 Conceptual Design
- 4.6 Remedy Selection and Documentation

4.4.1 Engineering Evaluation / Cost Analysis

- Statement of Site Problem(s)
- Reviewing and Finalizing Remediation Objectives
- Defining Alternative(s) for Analysis
- Analysis of Alternative(s)
- Developing EE/CA

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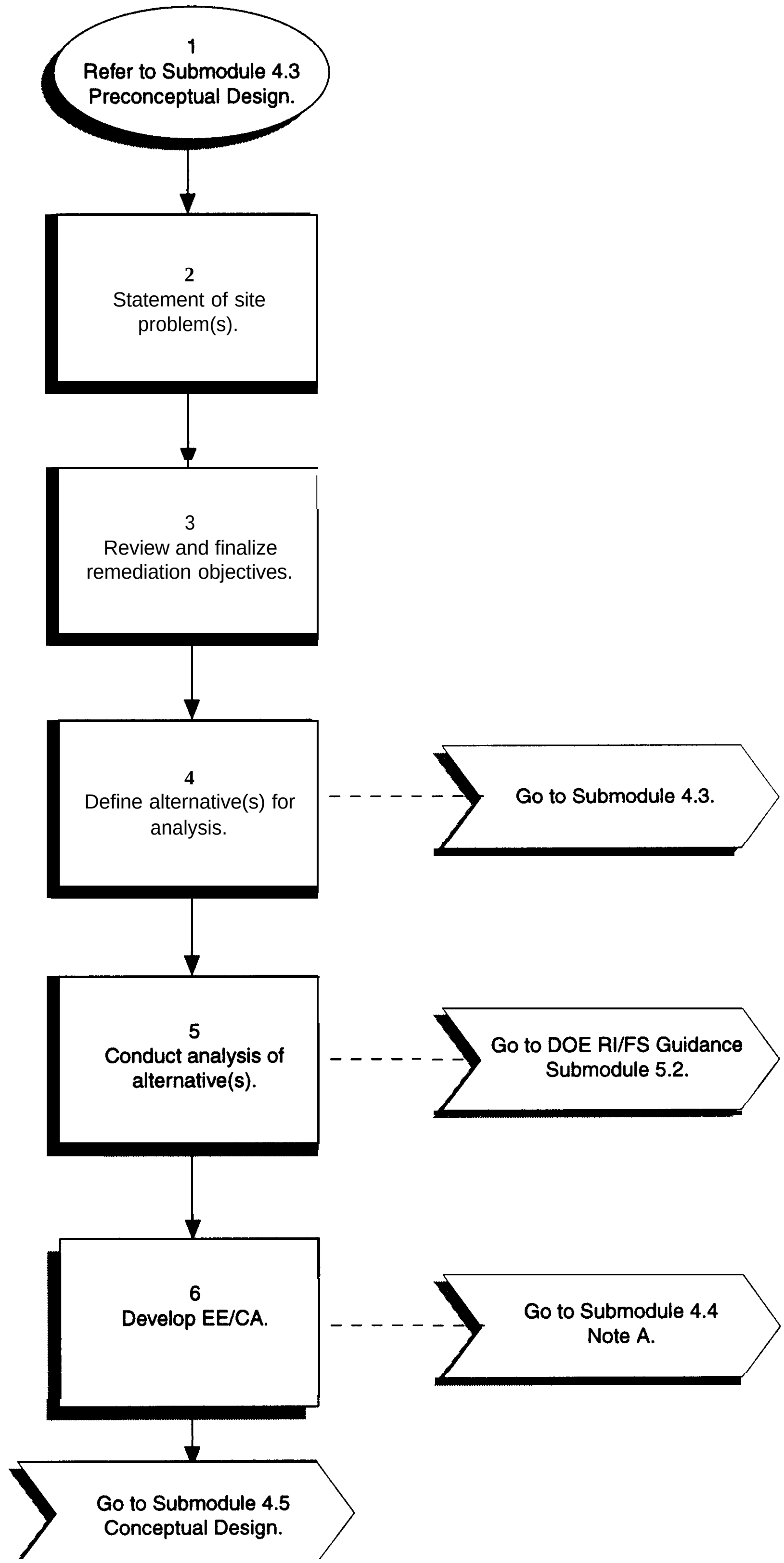
Submodule 4.4.1 Engineering Evaluation/Cost Analysis



Submodule 4.4.1 Engineering Evaluation/Cost Analysis

Step 1. Refer to Submodule 4.3, Preconceptual Design.

Step 2. **Statement of site problem(s).** The understanding of the site problem(s) initially developed in the consensus memorandum (and further developed in the work plan) should be updated in accordance with the LFI (if any) or any other additional site evaluation that has been performed. This statement of understanding will be used both in the EE/CA and subsequently in the Action Memorandum. The statement of the site problems should be focused on those aspects most relevant to the early action, but should also include an understanding of how the early action will affect the subsequent remediation of other site problems.

Step 3. **Review and finalize remediation objectives.** The remediation objectives initially developed in the consensus memorandum (and refined in the work plan) should be reviewed by the extended project team and revised in accordance with the LFI (if any) or any other additional site evaluation that has been performed. The statement of the objectives becomes a critical starting point for the design efforts (see Submodule 4.5, Conceptual Design) and will be one of the primary issues of consensus for the extended project team during the decision process (see Submodule 4.6, Remedy Selection and Documentation).

Step 4. **Define alternative(s) for analysis.** The alternative(s) under consideration have been defined in the preconceptual design (see Submodule 4.3, Preconceptual Design). They are incorporated in the EE/CA directly from those efforts. A "no-action" alternative is not required for a removal action.

Step 5. **Conduct analysis of alternative(s). The** EE/CA analyzes the alternative(s) against three criteria: (1) effectiveness, (2) implementability, and (3) cost. The analysis required is explained in *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA (EPA, 1993).* Additional direction can be found in DOE's RI/FS guidance, Submodule 5.2.

Step 6. **Develop EE/CA.** Submodule 4.4, Note A provides the suggested outline for an EE/CA. The EE/CA should be kept as short as practically possible. The site evaluation and decision process are not as extensive or as exhaustive as an RI/FS, and the documentation does not need to be as elaborate or detailed as a comprehensive FS. While no firm guidance can be given, an EE/CA most often can be kept well under one hundred pages including tables and figures. Additional information on the preparation of an EE/CA is presented in *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA (EPA, 1993).*

Submodule 4.4.2 Focused Feasibility Study

Non-Time-Critical Removal Actions and Early Remedial Actions
4.1 Scoping
4.2 Limited Field Investigations
4.3 Preconceptual Design
4.4 EE/CA or FFS
4.5 Conceptual Design
4.6 Remedy Selection and Documentation

4.4.2. Focused Feasibility Study

- Statement of Site Problem(s)
- Reviewing and Finalizing Remediation Objectives
- Defining Alternative(s) for Analysis
- Analysis of Alternative(s)
- Developing FFS

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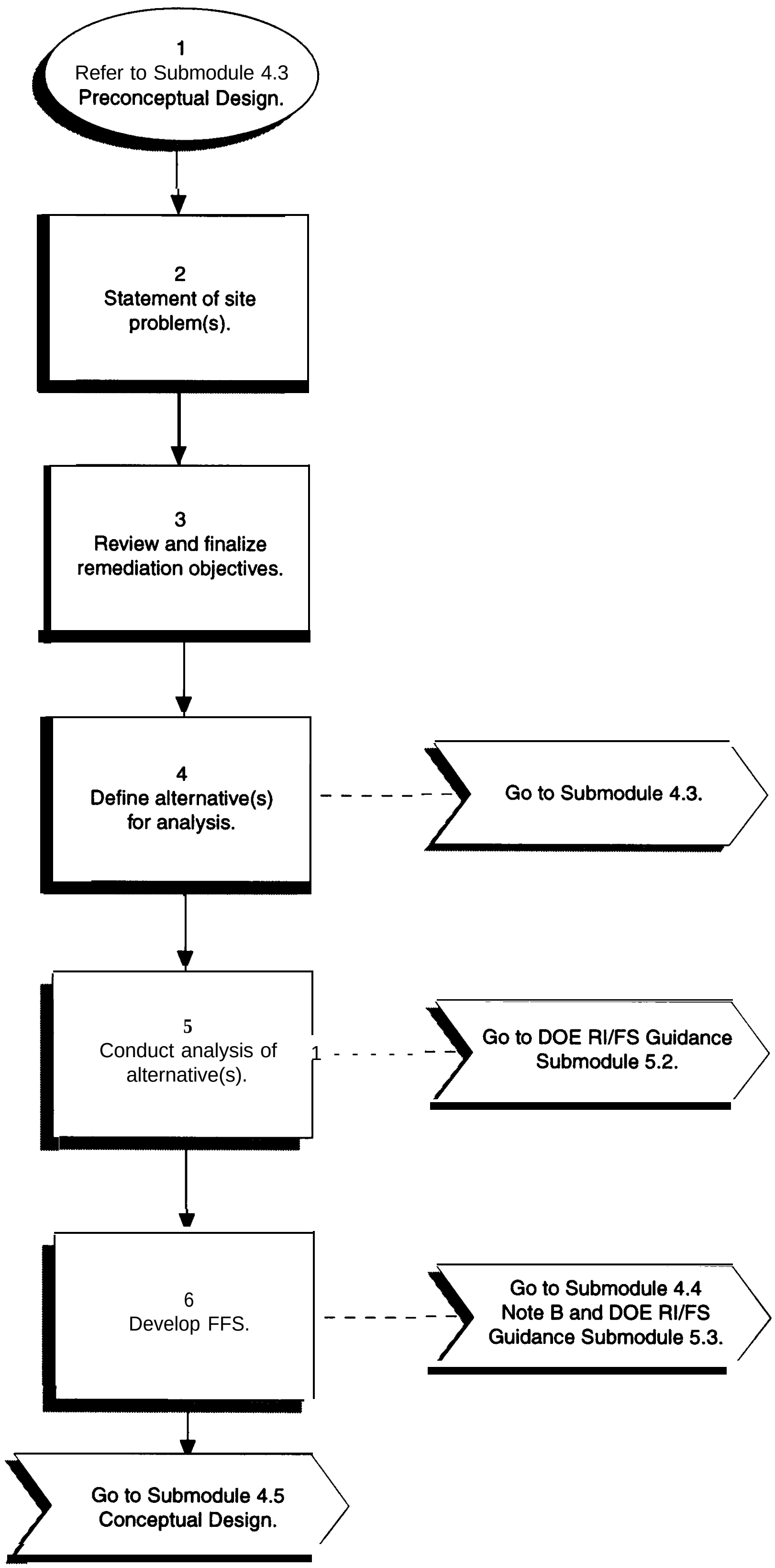
Submodule 4.4.2 Focused Feasibility Study



Submodule 4.4.2 Focused Feasibility Study

Step 1. Refer to Submodule 4.3, Preconceptual Design.

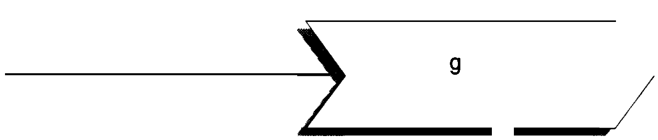
Step 2. **Statement of site problem(s).** The understanding of the site problem(s) initially developed in the consensus memorandum (and further developed in the work plan) should be updated in accordance with the LFI (if any) or any other additional site evaluation that has been performed. This statement of understanding will be used both in the FFS and subsequently in the Proposed Plan and ROD. The statement of the site problems should be focused on those aspects most relevant to the early action, but should also include an understanding of how the early action will affect the subsequent remediation of other site problems.

Step 3. **Review and finalize remediation objectives.** The remediation objectives initially developed in the consensus memorandum (and refined in the work plan) should be reviewed by the extended project team and revised in accordance with the LFI (if any) or any other additional site evaluation that has been performed. The statement of the objectives becomes a critical starting point for the design efforts (see Submodule 4.5, Conceptual Design) and will be one of the primary issues of consensus for the extended project team during the decision process (see Submodule 4.6, Remedy Selection and Documentation).

Step 4. **Define alternative(s) for analysis.** The alternative(s) under consideration have been defined in the preconceptual design (see Submodule 4.3, Preconceptual Design). They are incorporated in the FFS directly from those efforts. A "no-action" alternative is required for an early remedial action or an interim remedial action.

Step 5. **Conduct analysis of alternative(s).** The FFS analyzes the alternative(s) against seven criteria: (1) protectiveness, (2) ARARs compliance, (3) long-term effectiveness and permanence, (4) reduction of toxicity, mobility, or volume through treatment, (5) short-term effectiveness, (6) implementability, and (7) cost. The analysis required is explained in Submodule 5.2 of DOE's RI/FS guidance (DOE, 1993).

Step 6. **Develop FFS.** Submodule 4.4, Note B provides a suggested outline for an FFS. The FFS should be kept as short as practically possible. The site evaluation and decision process are not as extensive or as exhaustive as an RI/FS, and the documentation does not need to be as elaborate or detailed as a comprehensive FS. While no firm guidance can be given, an FFS most often can be kept well under one hundred pages. Additional information on the preparation of an FFS is presented in Submodule 5.3 of DOE's RI/FS guidance (DOE, 1993).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Note A. **Example EE/CA Format.**

Executive Summary

1. Site characterization
    1.1 Site description and background
    1.2 Previous removal actions
    1.3 Source, nature, and extent of contamination
    1.4 Analytical data
    1.5 Risk evaluation (as based on consensus memorandum)

2. Identification of removal scope, goals, and objectives
    2.1 Statutory limits on removal actions
    2.2 Understanding of site problem(s)
    2.3 Removal action objectives
    2.4 Determination of removal scope

3. Identification of removal action alternatives
    3.1 Description of Alternative 1
        3.1.1 Scope
        3.1.2 Contingency plans
        3.1.3 Cost estimate
    3.2 Description of Alternative 2 (if any)
        3.2.1 Scope
        3.2.2 Contingency plans
        3.2.3 Cost estimate

4. Analysis of removal action alternatives
    4.1 Individual Analysis
        4.1.1 Alternative 1
            4.1.1.1 Effectiveness
            4.1.1.2 Implementability
            4.1.1.3 cost
        4.1.2 Alternative 2 (if any)
            4.1.2.1 Effectiveness
            4.1.2.2 Implementability
            4.1.2.3 Cost
    4.2 Comparative analysis of alternatives
        4.2.1 Effectiveness
        4.2.2 Implementability
        4.2.3 Cost

5. Recommended removal action alternative

Appendices (as needed)

A. Detailed data from the LFI
B. Backup information for the cost estimates
C. Backup information for the ARARs analysis

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Note B. **Example FFS Report Format.**

Executive Summary

1. Introduction
   - 1.1 Purpose and organization of report
   - 1.2 Background information (summarized from work plan or LFI technical memorandum)
     - 1.2.1 Site description
     - 1.2.2 Site history
     - 1.2.3 Nature and extent of contamination [only as directly related to the envisioned removal action and the problem(s) it will address]
     - 1.2.4 Contaminant fate and transport [only as directly related to the envisioned removal action and the problem(s) it will address]
     - 1.2.5 Risk evaluation (as based on consensus memorandum)

2. Early action objectives
   - 2.1 Site problem/scope of early action
   - 2.2 Early action objectives
   - 2.3 Regulatory issues
   - 2.4 Schedule

3. Identification and definition of alternative(s)
   - 3.1 Identification of alternative(s)
   - 3.2 Description of defined alternative(s)
     - 3.2.1 Alternative 1
     - 3.2.2 Alternative 2 (if any)

4. Detailed analysis of alternative(s)
   - 4.1 Introduction
     - 4.1.1 Purpose of analysis
     - 4.1.2 The NCP criteria
   - 4.2 Individual analysis of alternatives
     - 4.2.1 Alternative 1 (vs the seven criteria)
     - 4.2.2 Alternative 2 (vs the seven criteria)
   - 4.3 Comparative analysis (if more than one alternative)

Appendices (as needed)
- A. Detailed data from the LFI
- B. Backup information for the cost estimates
- c. Backup information for the ARARs analysis
- D. Backup information for the focused risk assessment

Submodule 4.5 Conceptual Design

Non-Time-Critical Removal Actions and Early Remedial Actions	
4.1	Scoping
4.2	Limited Field Investigations
4.3	Preconceptual Design
4.4	EE/CA or FFS
4.5	Conceptual Design
4.6	Remedy Selection and Documentation

4.5 Conceptual Design
• Completing the Conceptual Design
• Preparing the Design Criteria Document
• Use of the Design Criteria Document

Submodule 4.5 Conceptual Design

Background

Following development of the preconceptual design (see Submodule 4.3, Preconceptual Design), design efforts can continue in parallel with the EE/CA or FFS and as the decision and documentation stages proceed. The conceptual design is completed at this time and then, after the Action Memorandum or ROD is signed, is developed further into a design criteria document. DOE Order 4700.1 requires development of a Design Criteria Document for many types of DOE construction projects; this DOE order does not strictly apply to environmental restoration projects, but the concept of a decision criteria document is standard engineering practice.

The Design Criteria Document presents and explains all of the fictional requirements that will have to be met by the remediation efforts. Early development of complete and detailed criteria for the early action facilitates orderly progress of the final design phase.

Development of the design criteria represents a significant point in the early action process. This is the final point at which the considerations in the decision process directly influence the considerations in the design process. All considerations are technical from this point, through implementation of the early action.

Throughout the early action process, from the development of the phased approach strategy and consensus memorandum to this point, two interdependent processes have proceeded in parallel:

(1) A public *decision* process, which is strongly influenced by the technical imperatives identified by the technical members of the extended project team working to understand the site problem(s) and the feasible methods of addressing it

(2) A technical *design* Process, which is strongly influenced by the regulatory and stakeholder concerns identified by the other members of the extended project team working through the decision process

The public decision process works out what is *necessary (e.g.,* ARARs compliance or waivers, remedial objectives, cleanup levels). The technical design process works out what is *possible (e.g.,* maximum sustainable pumping rates, minimum feasible treatment levels, minimum time to achieve full remediation).

The public decision process reaches an end at the signing of the Action Memorandum or ROD. From this point, the implementation of the early action should be nearly a pure technical project with allowances for the normal non-technical issues that any construction project must address (e.g., traffic regulations, NPDES limitations, hazardous waste manifest requirements).

Organization

Submodule 4.5 discusses the following:

- Completing the Conceptual Design
- Preparing the Design Criteria Document
- Use of the Design Criteria Document

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In addition, more detailed information is provided in the following note:

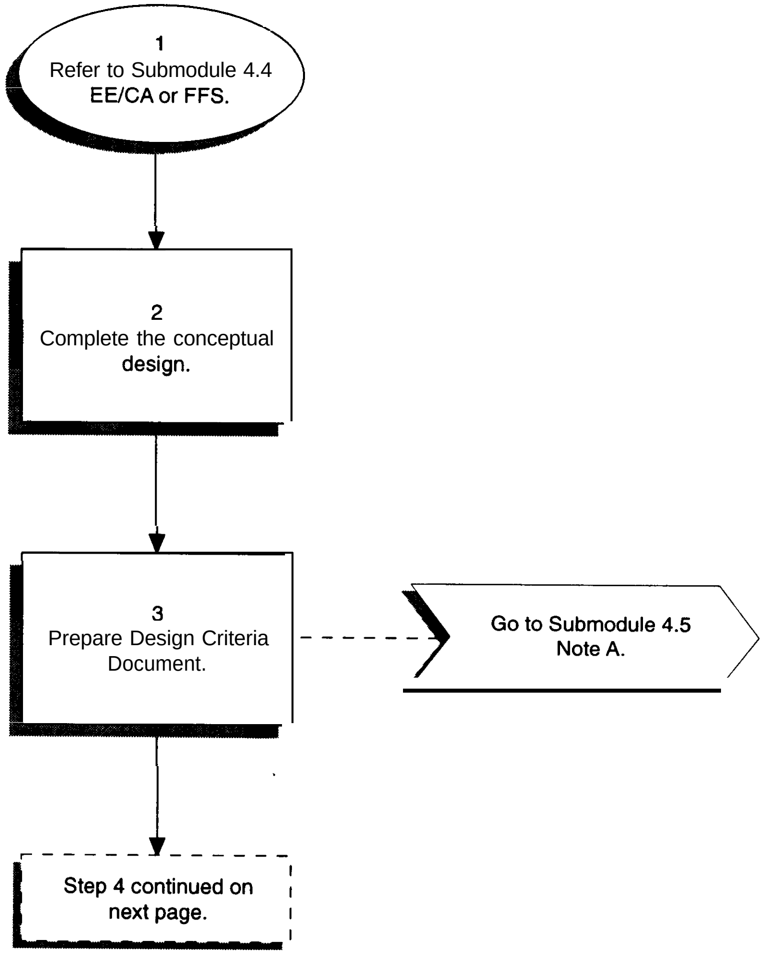
- Note A –Example Text for Design Criteria Document

Sources

1. DOE, September 1994, CERCLA *Removal Actions, DOE/EH-0435.*

2. **40 CFR 300, March 8, 1990,** *National Oil and Hazardous Substances Pollution Contingent Plan*, Federal Register, Vol. 55, No. 46 Rules and Regulations.

Submodule 4.5 Conceptual Design



Step 1. Refer to Submodule 4.4, Engineering Evaluation/Cost Analysis or Focused Feasibility Study.

Step 2. **Complete the conceptual design.** The conceptual design defines all of the major features of the final design for the early action. This phase is generally thought of as the 30 percent design stage. Under ideal conditions, 70 percent of the design budget should remain at the end of the conceptual design to finalize (during final design) the multitude of details regarding how the early action will be carried out. But, all of the major features are decided at the completion of the conceptual design and the design is "frozen" from further changes in its major elements. The remaining design budget is committed to the final design effort, which is beyond the scope of this guidance document.

Conceptual design and final design are standard concepts in engineering practice and are well understood by the engineering community. Guidance on managing design and construction projects at DOE facilities is available as supplements to DOE Order 4700.1. [Please note that, at this writing, DOE is in the process of revising project management guidance for ER projects. Consult with EM-43, Office of Program Integration.]

Step 3. **Prepare Design Criteria Document.** The final decisions in the Action Memorandum or ROD may place additional requirements on the remediation not anticipated in the preconceptual design. For example, an expected waiver of an ARAR may not be included in the decision document, thus necessitating changes in the design criteria. Thus, the final design criteria derive from both the conceptual design and from the final decision document. The DOE project manager or designee is responsible for ensuring that the design criteria reflect all of the requirements and objectives in the Action Memorandum or ROD.

Development of the design criteria actually began when the need for the early action was identified and initial concepts for a remedial approach were delineated. The majority of the criteria were developed and validated during preconceptual design. The purpose of establishing very specific design criteria is to ensure that the final design will meet all of the remediation objectives in the Action Memorandum or ROD.

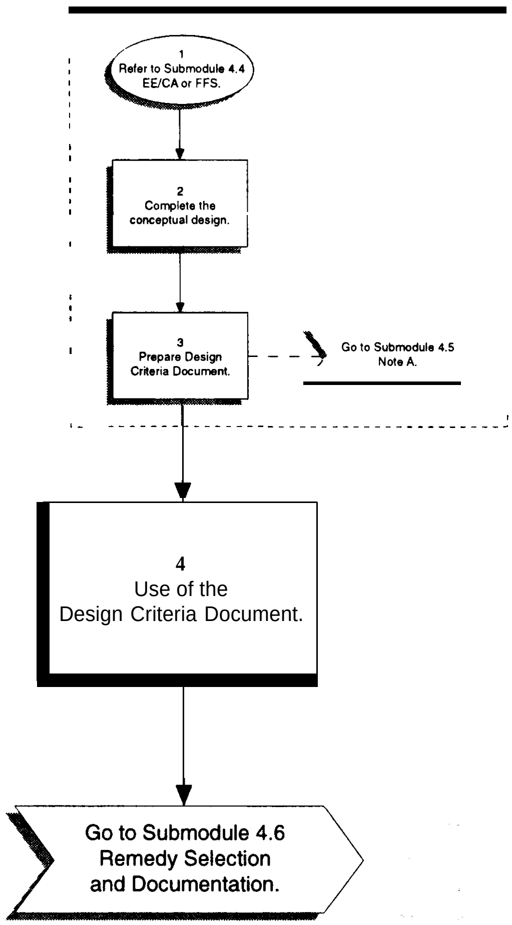
Completeness and clarity of the design criteria are the most important factors in this stage of the early action process. However, completeness should not be affected such that the design team is narrowly constricted in acceptable design approaches. The criteria should represent the *essential minimum requirements* that the final remediation must meet, but all possible flexibility should be retained.

A few examples can clarify the concept of design criteria:

- Required pumping rates for the extraction system are projected to be between 18 and 32 gallons per minute (gpm). The treatment system shall be provided with flow equalization capability and/or treatment capacity to handle sustained flows over a 24-hr period as low as 15 gpm and as high as 40 gpm.

- A paved, bermed, and storm water-controlled staging and turnaround area shall be provided to handle one actively loading 15-yd dump truck and two waiting 15-yd dump trucks.

Submodule 4.5 Conceptual Design (cont.)



- The berms on the impoundments shall be stabilized through adequately designed upgrades to withstand a maximum credible earthquake. For the purposes of this design, the maximum credible earthquake is defined to involve horizontal accelerations up to 0.7 g.

Submodule 4.5, Note A provides example text for a Design Criteria Document.

Step 4. **Use of the Design Criteria Document.** Much of the text of the design criteria document will be incorporated directly in the design criteria package after the Action Memorandum or ROD is signed, and thus will be incorporated in the scope of work given to the design team for final design.

Once the design criteria document is complete, additional materials are added to assemble the design criteria package (sometimes called a design basis report). This step requires assembling a great amount of material, some of which may have to be changed if the selected alternative differs from the preferred alternative as presented in the Draft Action Memorandum or Proposed Plan. Preparing the design criteria package is beyond the scope of this document.

Additional information on design criteria packages is provided in Chapter 5 of DOE Order 4700.1.

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Note A. **Example Text for Design Criteria Document. This** example of a section for a design criteria document is taken from a draft Design Basis Report for the Bayou Bonafuca Site in Louisiana. It addresses only one element of the overall remedial action for the site – relocating a drainage channel. It exemplifies the level of detail and specificity that should be possible in the design criteria document for an early action site.

Any of the methods or means listed may change during final design. The details are listed to portray very clearly to the design team the final result desired, as well as the limitations that must be accounted for and the potentially acceptable approaches that should be considered for the final design. In contrast to the detailed methods and means, the objectives and overall approach cannot be modified by the design team without the concurrence of the extended project team.

4.3 EAST DRAINAGE CHANNEL RELOCATION	
4.3.1 SCOPE AND OBJECTIVE	
The engineered drainage channel (EDC) is located in the east portion of the property; since it bisects the area planned for the incineration facilities, it will be relocated to within 25 feet of the east property boundary as shown in Figure 3-2.	
The ROD specifies that contaminated sediments and soils in the EDC will be excavated and incinerated. The excavation should also include the dredge spoils on both sides of EDC; it should extend 50 feet from the EDC and it should not extend deeper than 3 feet,	**Integrating political decisions (i.e., ROD requirements) with technical possibilities.**
Previous investigations indicated that the area of the EDC is underlain by con tarninated sediments; the depth of the contamination increases from north to south and ranges from 2.6 to 6.1 feet below the mudline. All borings in the area indicated at least 1 foot of high plasticity clay at the bottom; the clay was relatively uncontaminated in all borings except for boring EDC- 1 where the contamination extended 3 feet into it. Excavations for the relocated EDC are assumed to be in uncontaminated soils.	**Expected conditions.**
4.3.2 SPECIFICATIONS REQUIREMENTS	
The EDC specifications will be of a detailed mode except, for some minor parts of work such as the construction dewatering. The specifications will include the cross-sections and alignment of the new EDC, excavation cross sections for the old EDC (to be approved by the EPA), sequence of excavation, methods of the old channel backfilling, dewatering requirements, and treatment of water from dewatering. The excavation dredgelines will be provided in the intermediate design.	**Level of design required.**
The Contractor will be required to submit a detailed schedule on the excavation and backfilling of the EDC, methods of dealing with water from construction dewatering, and methods of protection or demolition of the groundwater recovery wells along the old EDC channel.	**Contractor requirements.**
4.3.2.1 New Channel Excavation	
The new channel cross section will be designed so that the invert elevation closely coincides with the old channel. The side slopes will be 2(H): 1 (V). Clean soils from the excavation will be temporarily stored and used for the backfill of the old channel. Following the excavation, water from the old channel will be diverted into the new channel.	**Functional design requirements.**
The construction of the new EDC will be specified by detailed design. The design will have to be verified by the COE for the hydrologic assumptions and criteria used.	

4.3.2.2 Old Channel Excavation The sediments and contaminated soils in the EDC will be excavated to dredge lines specified on cross sections in the design and approved by EPA. The depth of the dredgelines below the channel bottom will range between 3 feet at the boring EDC-4 location to 7.5 feet at the south end of the EDC. The design channel cross section has side slopes 1(H): l(V); flatter slopes will be specified if stability problems are encountered during the excavation.	Design performance requirement.
Dredge spoils on each side of the ditch will need to be excavated in lifts; 1-foot lifts should be used with a maximum excavation depth of 3 feet. The excavation will be performed to a maximum of 50 feet from the edge of the EDC.	Design specification.
All sediments from the EDC will be incinerated; the soil from both sides of the channel will be sampled according to a grid pattern and tested; soil with contamination of >1,000 ppm total PNA's will be incinerated; soils with contamination between 100 and 1,000 ppm total PNA's will be deposited in the landfill.	
The Contractor will be required, during the excavation and during the following channel backfill, to provide dewatering of the excavation from construction activities so that the groundwater levels are maintained below the - excavation bottom. Water from the dewatering system will be treated before discharge to the Bayou. Discharge limits will be specified in the wastewater treatment specifications.	Design performance requirement.
The earthwork at the EDC may interfere with the operation of the wells along the west edge of the channel in the ground water recovery system. According to EPA, these wells should be operational between March 1991 and March 1992. If the wells are operating during the Contractor's work at the EDC, the Contractor will provide well protection; if the wells are abandoned, the Contractor will demolish the wells according to procedures to be specified.	
4.3.2.3 Temporary Soil Storage Excavated soils to be incinerated may have to be stored temporarily, as neither the incinerator nor the landfill may be functional during the time of the excavation.	
Temporary storage will have to be provided at the location of the future landfill. This temporary storage will have to include a bottom liner, a flood protection dike, and a temporary cap, consisting of 6 inches of clay or of a plastic cover such as Griffolyn. The size of this temporary storage is assumed to be on the order of 0.25 acres.	Design specification.

4.3.2.4 Old Channel Backfill	
Following the excavation, the old channel will be backfilled to the elevation of the existing surface. Because the area of the old EDC will be used for the incineration facilities, the channel backfill will be designed as a structural fill.	**Design functional requirement.**
The backfill material will be from the excavation for the new EDC and from offsite borrow sources. Contamination testing will be required for all onsite materials used as backfill.	
Construction dewatering will be required during the backfill of the old EDC. It must be assumed that the water from the dewatering system will be contaminated. The Contractor will secure water treatment either in the new water treatment facility if already constructed or in the groundwater recovery water treatment facility. If water treatment cannot be provided, the water will be stored for future treatment.	**Expected conditions.**
4.3.3 ASSUMED APPROACH FOR COST AND SCHEDULE	
It is assumed that the new EDC will be excavated to the specified dredgelines without any need for dewatering except for pumping from sumps. Soils from the excavation will be tested for contamination and temporarily stored. Water from the old EDC will be diverted into the new channel and the old channel will be isolated by cofferdams.	**Design functional requirement.**
The excavated old EDC sediments and soils will be stored temporarily on the landfill site; storage will require a temporary liner both under and over the waste pile. According to preliminary volume calculations, we expect that the total volume of the contaminated sediments will be between 4,300 and 6,000 yd^3. Total volume of soils and sediments from the EDC sides (including dredged spoils adjacent to the channel) is estimated between 6,300 and 11,300 yd^3.	**Expected conditions.**
Backfilling of the old EDC will use, as a source, uncontaminated soils obtained from the new EDC excavation and, if necessary, borrow material from offsite sources. We assume that sand from identified sources (within 15 miles offsite) will be used.	

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Submodule 4.6 Remedy Selection and Documentation

Non-Time-Critical Removal Actions and Early Remedial Actions

4.1 Scoping

4.2 Limited Field Investigations

4.3 Preconceptual Design

4.4 EE/CA or FFS

4.5 Conceptual Design

4.6 Remedy Selection and Documentation

4.6.1 Non-Time-Critical Removal Actions

4.6.2 Early Remedial Actions

Background

The decision document for a non-time-critical removal action is an Action Memorandum. The decision document for an early remedial action is a ROD. EPA has published an Action Memorandum Guidance (EPA, 1990) and ROD guidance (EPA, 1989). The ROD guidance addresses both early and interim final actions. The requirements for action memoranda are different from the requirements for a ROD, but significant commonality exists in the contents and purposes of the two documents.

The primary purposes of both documents are:

- To identify the authority under which the response action will be taken

- To document that an action is required to protect public health and/or the environment and that expenditure of DOE funds for the response is justified. (Protecting public health and the environment is the fundamental purpose of CERCLA and of any response action taken under the act.)

- To describe the action that has been selected as the appropriate response, within the decision document, or partly by reference to more detailed descriptions elsewhere

- To explain the reasons for the particular response that has been selected. For an Action Memorandum, this justification is primarily in terms of three criteria: effectiveness, implementability, and cost (EPA, 1990). For a ROD, this explanation is primarily in terms of the nine NCP criteria.

- To present the conclusions of DOE, EPA, and the State on the regulatory requirements that apply to the response action (ARARs) and how each will be met or, if appropriate, waived

- To describe the public participation process that has been followed in identifying and selecting the response action

Organization

Submodule 4.6.1 discusses remedy selection and documentation for non-time-critical removal actions including:

- Stakeholder meeting
- Preparation of the Draft Action Memorandum
- Preparation of the Administrative Record
- Public comment period
- Preparation of the Final Action Memorandum
- Update Administrative Record and provide public access
- Publication of the Action Memorandum
- Post-decision document changes

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Submodule 4.6.2 discusses remedy selection and documentation for early remedial actions including:

- Stakeholder meeting
- Preparation of the Proposed Plan
- Preparation of the Administrative Record
- Public comment period
- Preparation and finalization of the ROD
- Update Administrative Record and provide public access
- Publication of the ROD
- Post-decision document changes

In addition, more detailed information is provided in the following note:

- Note A – EPA-Specified Outline for an Action Memorandum

Sources

1. U.S. EPA, June 1988, *Community Relations in Supefund: A Handbook, Interim Version, EPA/540/6-88/O02,* OSWER Directive 9230.0.38.

2. U.S. EPA, 1989, *Interim Guidance on Administrative Records for Selection of CERCLA Response Actions.*

3. U.S. EPA, 1989, *Guidance on Preparing Supefund Decision Documents: me Proposed Plan, me Record of Decision, Explanation of Significant Differences, The Record of Decision Amendment,* OSWER Directive 9355.3-02.

4. U.S. EPA, 1989, *A Guide to Developing Supefund Records of Decision,* OSWER Directive 9355 .3-02FS-1.

5. U.S. EPA, 1990, *Superfund Removal Procedures: Action Memoratium Guidance.*

6. U.S. EPA, 1992, *Superfund Removal Procedures –Public Participation Guidance for On-Scene Coordinators: Community Relations and the Administrative Record,* OSWER Directive 9360.3-05.

7. DOE, December 1993, *Remedial Investigation/Feasibility Study (W/FS) Process, Elements, and Techniques Guidance, DOE/EH-94007658.*

8. DOE, September 1994, *CERCU Removal* **Actions, DOE/EH-0435.**

9. **40** CFR 300, March 8, 1990, *National Oil and Hazardous Substances Pollution Contingent Plan,* Federal Register, Vol. 55, No. 46 Rules and Regulations.

10. U.S. DOE, U.S. EPA, May 25, 1995, *Policy on Decommissioning of Department of Energy Facilities Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), p. 4.*

Submodule 4.6.1 Non-Time-Critical Removal Actions

Non-Time-Critical Removal Actions and Early Remedial Actions

- 4.1 Scoping
- 4.2 Limited Field Investigations
- 4.3 Preconceptual Design
- 4.4 EE/CA or FFS
- 4.5 Conceptual Design
- 4.6 Remedy Selection and Documentation

4.6.1 Non-Time-Critical Removal Actions

- Stakeholder Meeting
- Preparation of Draft Action Memorandum
- Preparation of Administrative Record
- Public Comment Period
- Preparation of Final Action Memorandum
- Update Administrative Record and Provide Public Access
- Publication of Action Memorandum
- Post-Decision Document Changes

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Submodule 4.6.1 Non-Time-Critical Removal Actions

1
Refer to Submodule 4.5
Conceptual Design.

2
Conduct stakeholder
meeting.

NOTE:
Consult DOE's *CERCLA Removal Actions* (1994) for additional detail on procedural requirements for issuing action memoranda.

3
Prepare Draft Action
Memorandum.

Go to Submodule 4.6
Note A.

4
Prepare
Administrative Record.

Go to DOE RI/FS Guidance
Submodule 6.1
Note D.

5
Establish public
comment period.

Go to DOE RI/FS Guidance
Submodule 6.1.

Step 6 continued on
next page.

Submodule 4.6.1 Non-Time-Critical Removal Actions

Step 1. Refer to Submodule 4.5, Conceptual Design.

Step 2. **Conduct stakeholder meeting.** In practice, the extended project team should be sufficiently integrated into the early action process so that separate, distinct meetings are not necessary. However, at a minimum, a meeting of the extended project team is recommended once any LFI is complete, the EE/CA is substantially complete, and the remedy selection process is ready to proceed. The purposes are (1) to review and approve the results of the decision and design support phase; (2) to reach consensus on the details of the response action to be proposed for public consideration; (3) to reach consensus on the schedule and other details of the public participation process to be followed in reaching the final decision on the removal action; and (4) to resolve any issues regarding the draft Action Memorandum that will be developed by DOE and presented to the public. Following this meeting, DOE should prepare the draft Action Memorandum and begin the public participation process.

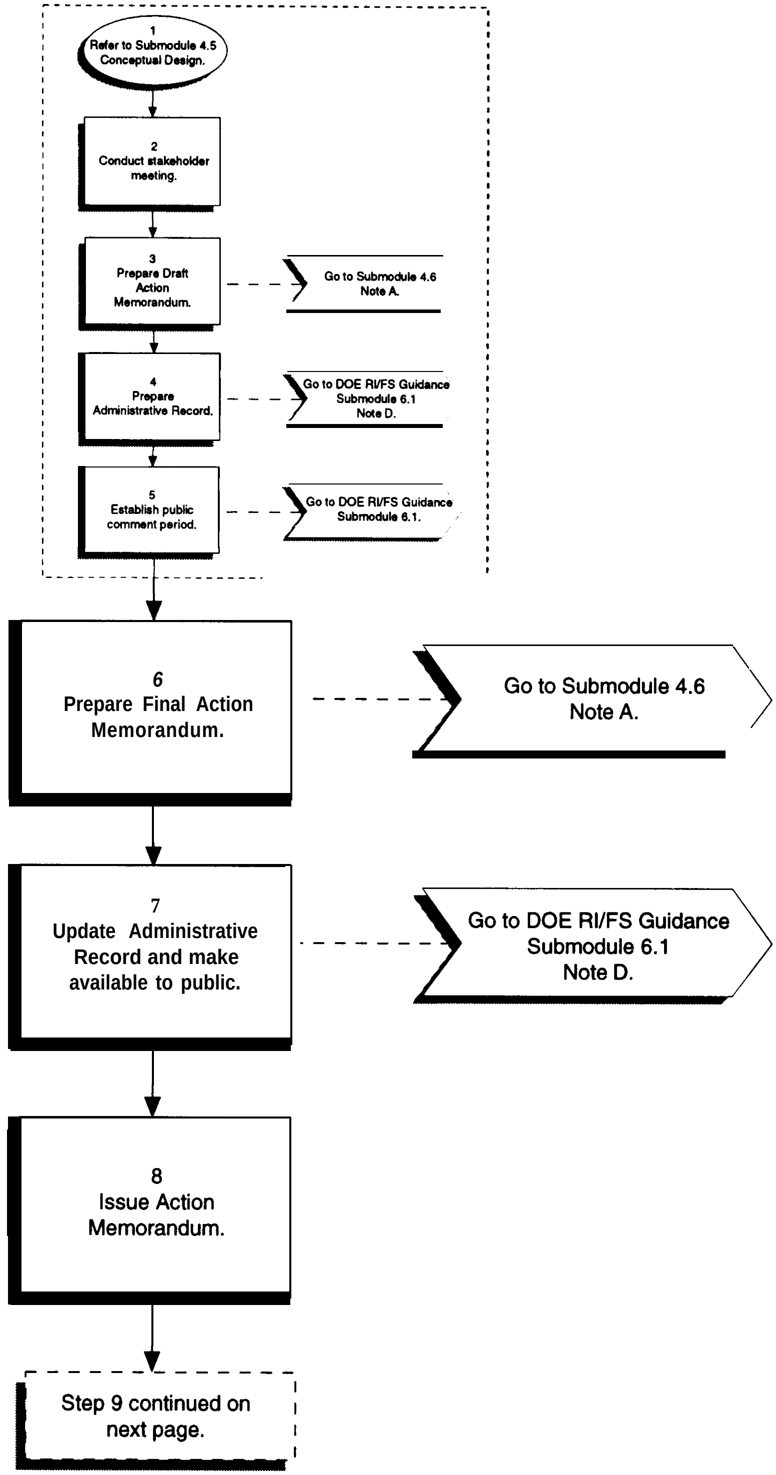
Step 3. **Prepare Draft Action Memorandum.** A draft of the Action Memorandum is prepared for release with the EE/CA. This is not a required step under EPA guidance, but is recommended because there is adequate time for fill public participation in a non-time-critical removal action. The purposes are the same as for a Proposed Plan released with an FFS – to describe to the public the envisioned response action (i.e., a non-time-critical removal), to present the basis for selecting the response action, and to solicit public comment.

The draft Action Memorandum should be prepared according to the format and other requirements that will be followed for the final Action Memorandum, specifically the requirements in EPA's Action Memorandum Guidance (EPA, 1990). Submodule 4.6, Note A presents the specified outline for action memoranda. EPA (1990) provides detailed instructions on preparing action memoranda. [Note that some of the guidance in EPA (1990) relates only to EPA-lead removals that involve trust fund monies or an administrative order, and does not need to be followed for a removal at a DOE site.]

Step 4. **Prepare Administrative Record.** Development of an Administrative Record for a removal action is required by CERCLA Section 113(k) and the NCP. The Administrative Record is a compilation of documents upon which the remedy selection is based. Specific guidance on the preparation and contents of the Administrative Record is given in *Interim Guidance on Administrative Records for Selection of CERCLA Response Actions* (EPA, 1989), in Subpart I of the NCP, and in Chapter 6 of the EPA community relations handbook (EPA, 1988). The Administrative Record should consist of documents that DOE considered or relied on to select the response action and documents that demonstrate the public's opportunity to participate in selection of the response action. DOE's RI/FS guidance, Submodule 6.1, Note D provides a list of documents typically included in an Administrative Record.

Step 5. **Establish public comment period.** **The** DOE project manager or designee must make arrangements for a public meeting if one is requested by any stakeholder. me public meeting is arranged for and held by DOE. The public review period is a minimum of 30 days (NCP requirement), but a longer period may be appropriate for some actions.

Submodule 4.6.1 Non-Time-Critical Removal Actions (cont.)



Additional information on public participation responsibilities is given in *Supefund Removal Procedures – Public Participation Guidance for On-Scene Coordinators: Community Relations and the Administrative Record* (EPA, **1992)** and DOE's RI/FS guidance, Submodule 6.1.

Step 6. **Prepare Final Action Memorandum.** The purposes of the action memorandum are similar to those of a ROD. One primary difference is the level of risk determination can be more qualitative than that required for an early action or interim remedial action.

CERCLA statutory limits on removal actions (i.e., 1 year and $2 million) do not apply to DOE removal actions because they are not fund financed (DOE/EPA, 1995). Facility-specific Federal Facilities Agreements (FFAs) should be examined to assess whether the limitations apply.

Detailed information for preparing Action Memoranda and a specific outline are provided in *Supefund Removal Procedures: Action Memorandum Guidance* (EPA, 1990). The outline is provided in Submodule 4.6, Note A.

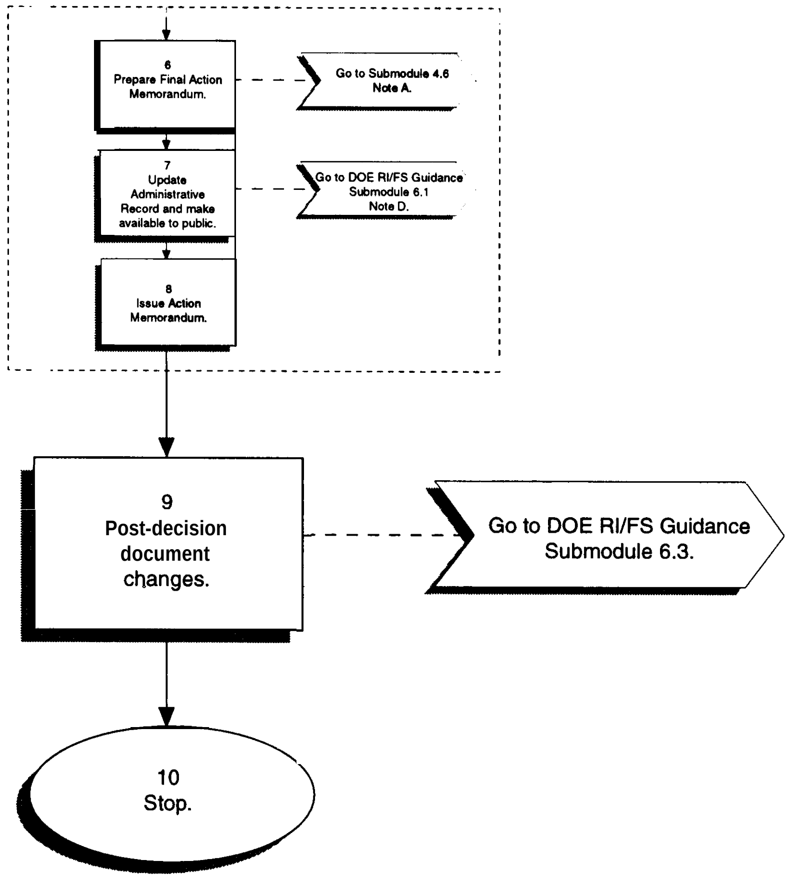
Step 7. Update Administrative Record and make available to public. The Administrative Record was initiated during scoping and kept current throughout the process. It was brought to a high level of completeness and organization upon release of the EE/CA and draft Action Memorandum. At this point, addition of public comments, transcripts of public meetings, and the final Action Memorandum should be sufficient to ensure that the Administrative Record is complete. This is necessary in the event of any challenges to the selected remedy. Any court review would be based primarily on the Administrative Record. Additional detail on requirements of the Administrative Record is presented in DOE's RI/FS guidance, Submodule 6.1, Note D.

Step 8. **Issue Action Memorandum.** A newspaper release is required to denote the signing of an Action Memorandum. Guidance on the publication of an Action Memorandum is provided in *Supefund Removal Procedures – Public Participation Guidance for On-Scene Coordinators: Community Relations and the Administrative Record* (EPA, 1992).

EPA guidance does not specify the contents of the notice for an Action Memorandum; however, the required elements for a ROD notice are useful guidelines:

- Site name and notice of availability of the [Action Memorandum]
- Date on which the [Action Memorandum] was signed
- Brief summary of the major elements of the selected remedy
- Details about the hours of availability of the Administrative Record and/or the information repository
- Name and telephone number(s) of individual(s) to contact for further information

Submodule 4.6.1 Non-Time-Critical Removal Actions (cont.)



Step 9. **Post-decision document changes.** Changes in the approach to the removal action may occur after the Action Memorandum is signed. Such changes may, for example, occur as a result of the final design effort. If such changes result in a fundamental difference in how the early action is to be carried out [e.g., changing the technology being used (in situ biotreatment replaced by low temperature ex situ thermal resorption)], the public and the extended project team must have an opportunity to comment before the action is implemented.

The Action Memorandum should be written to allow the maximum flexibility in establishing the final approach to remediation (see Step 6). This minimizes the potential for changes that require public involvement.

DOE’s RI/FS guidance, Submodule 6.3 addresses post-ROD changes for final remedial actions. The formality required in dealing with changes for final actions is less appropriate for early actions. Because a removal action is not a final remedial action, more flexibility is allowed in dealing with post-Action Memorandum changes. Any early actions can be summarized and endorsed in the final ROD. Public notice, with some opportunity to comment on truly fundamental changes, is required. Reissuing an Action Memorandum should not be required unless the original decision document was too narrowly constructed.

Step 10. Stop.

Submodule 4.6.2 Early Remedial Actions

Non-Time-Critical Removal Actions and Early Remedial Actions

- 4.1 Scoping
- 4.2 Limited Field Investigations
- 4.3 Preconceptual Design
- 4.4 EE/CA or FFS
- 4.5 Conceptual Design
- **4.6 Remedy Selection and Documentation**

4.6.2 Early Remedial Actions

- Stakeholder Meeting
- Preparation of Proposed Plan
- Preparation of Administrative Record
- Public Comment Period
- Preparation and Finalization of ROD
- Update Administrative Record and Provide Public Access
- Publication of ROD
- Post-Decison Document Changes

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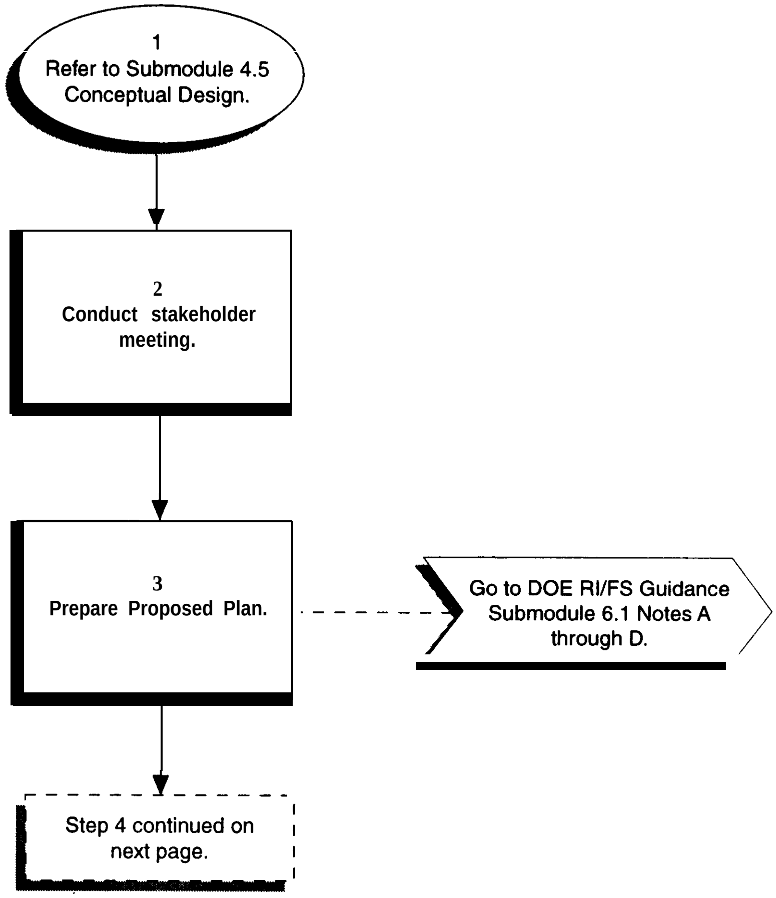
Submodule 4.6.2 Early Remedial Actions



Submodule 4.6.2 Early Remedial Actions

Step 1. Refer to Submodule 4.5, Conceptual Design.

Step 2. **Conduct stakeholder meeting.** A meeting of the extended project team is recommended once the LFI is complete, the FFS is substantially complete, and the remedy selection process is ready to proceed. The purposes are (1) to review and approve the results of the decision and design support phase; (2) to reach consensus on the details of the response action to be proposed for public consideration; (3) to reach consensus on the schedule and other details of the public participation process to be followed in reaching the final decision on the early action; and (4) to resolve any issues regarding the Proposed Plan to be developed by DOE and presented to the public. Following this meeting, DOE should prepare the Proposed Plan and begin the public participation process.

Step 3. **Prepare Proposed Plan.** DOE is responsible for drafting the Proposed Plan for an early or interim remedial action. DOE's RI/FS guidance, Submodule 6.1, Notes A and B provide an outline, suggested language, and an example Proposed Plan. The Proposed Plan should be quite brief (e.g., 10 to 12 pages). While several elements are required, even the most complex issues (e.g., the nature and results of the risk assessment) can be handled very briefly (e.g., 2 to 4 pages) by presenting only the relevant results of the LFI and FFS. Stakeholders who desire additional detail can consult the LFI and FFS reports or the Administrative Record. The Proposed Plan can be developed in a fact sheet format or in a slightly expanded format that provides additional details.

Certain elements must be included in the Proposed Plan. The example outline and the example Proposed Plan provided in the Notes listed above (DOE's RI/FS guidance) should be consulted for a complete listing. Several of the specific requirements are:

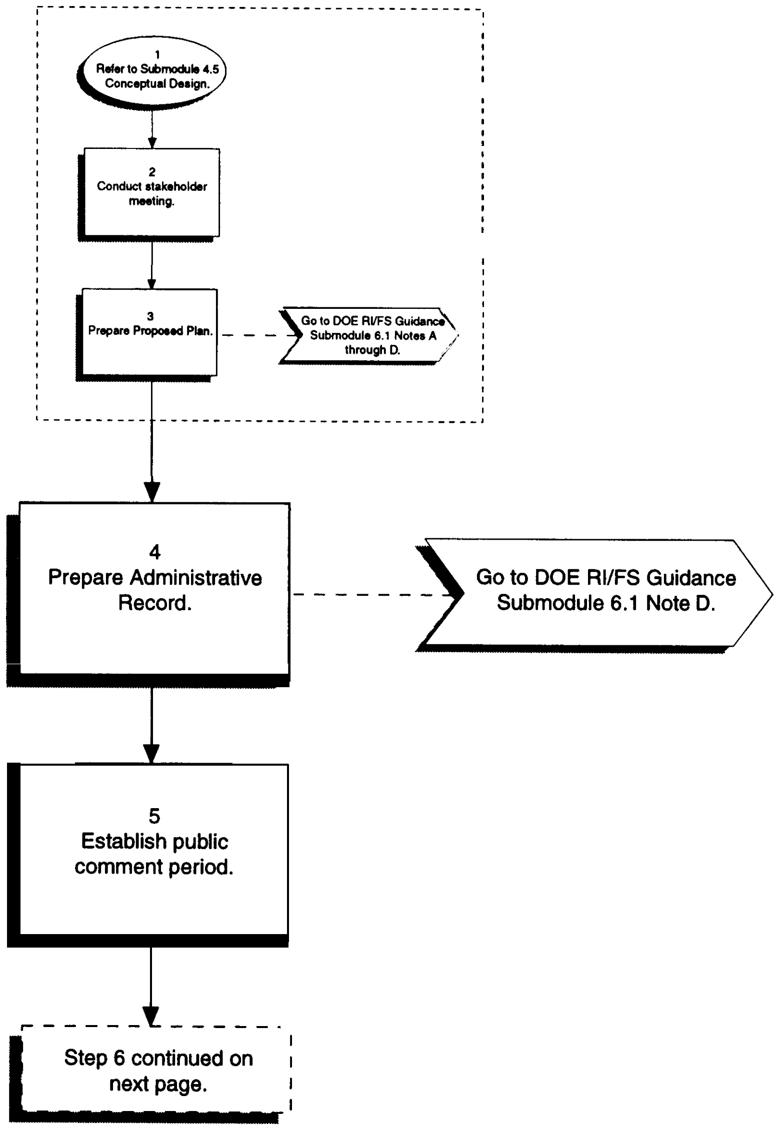
- A specific "Finding of Risk" paragraph, concluding that remedial action is necessary, must be included in any Proposed Plan.

- The alternative(s) must be presented in accordance with the two threshold criteria (overall protection of human health and the environment, and compliance with ARARs) and the five balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost). If more than one alternative exists, the presentation focuses on the important differences among the alternatives, emphasizing the five balancing criteria rather than presenting an exhaustive summary of the detailed analysis in the FFS.

- The preferred alternative represents the best approach as based on the five balancing criteria.

- The preferred alternative should meet the CERCLA expectations for protectiveness, ARARs compliance, cost-effectiveness, permanence, and use of treatment to the maximum extent practicable. If one or more of the CERCLA requirements will not be met (e.g., the preference for use of treatment-based alternatives), the Proposed Plan needs to be explicit on that point and explain briefly why the expectation cannot be met.

Submodule 4.6.2 Early Remedial Actions (cont.)



- Public participation information should consist of the “who, what, when, and how” that is needed to enable public comment on the preferred alternative and the supporting data.

- Specific statements of the EPA and State regulatory agency positions should include the preferred alternative and other aspects of the Proposed Plan. The State’s position on the preferred alternative constitutes the basis for evaluation of the NCP’S eighth criterion, “State Acceptance. ”

In addition to these issues, the Proposed Plan must provide a perspective on the OU being addressed, its relationship to any other OUs at the site, and the relationship of the early or interim remediation to overall site cleanup. Finally, certain regulations require specific opportunity for public comment. For examples, land disposal restriction (LDR) treatability variances under 40 CFR 268.44 and Corrective Action Management Units (CAMUs) under 40 CFR 264.552 are two ARARs for which specific comments must be elicited. If any of these regulatory options will be used, the Proposed Plan specifically solicits public comments on use of the option.

EPA/State concurrence must be obtained on the Proposed Plan. The DOE project manager or designee must arrange for review and comment opportunities for the regulatory agencies during preparation of the Proposed Plan. Given the high level of cooperation and shared viewpoint typically necessary to move an early action forward to the decision point, EPA and the State may concur in and sign the Proposed Plan, thus making it a joint document.

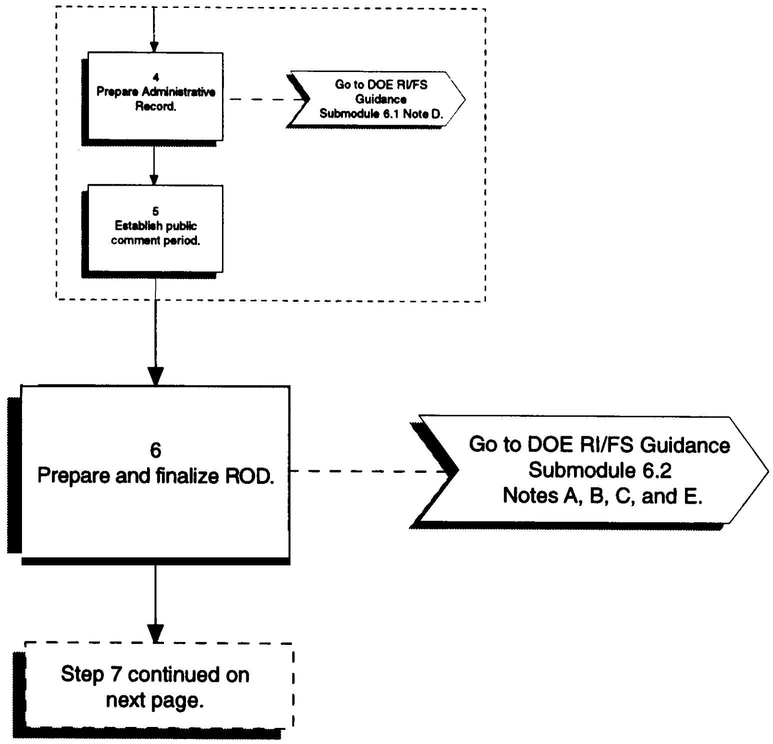
(See DOE’s RI/FS guidance Submodule 6.1, Notes A through D.)

Step 4. Prepare Administrative Record. The development of an Administrative Record for a remedial action is required by CERCLA Section 113(k) and the NCP. The Administrative Record is a compilation of documents upon which the remedy selection is based that are made available to the public during the comment period. Specific guidance on the preparation and contents of the Administrative Record is given in *Interim Guidance on Administrative Records for Selection of CERCLA Response Actions* (EPA, 1989), in Subpart I of the NCP, and in Chapter 6 of the EPA community relations handbook (EPA, 1988). The Administrative Record should consist of documents that DOE considered or relied on to select the response action and documents that demonstrate the public’s opportunity to participate in selection of the response action. DOE’s RI/FS guidance, Submodule 6.1, Note D provides a list of documents typically included in an Administrative Record.

Step 5. Establish public comment period. Publish the proposed plan and facilitate public input. The Proposed Plan must be made available to anyone who requests a copy. A newspaper notice of the availability of the Proposed Plan that includes the time and place of a public meeting is required (see DOE’s RI/FS guidance, Submodule 6.1, Note D). The seven required sections of the newspaper notice are:

- Site name and location
- Date and location of a public meeting
- Identification of lead and support agencies
- Alternative(s) evaluated in the detailed analysis
- Identification of the preferred alternative

Submodule 4.6.2 Early Remedial Actions (cont.)



- Request for public comments
- Public participation information

The DOE project manager or designee must make arrangements for a public meeting if one is requested by any stakeholder. The public meeting is arranged for and held by DOE. The public review period is a minimum of 30 days (NCP requirement), but a longer period may be appropriate for some actions. Additional information on public participation responsibilities is given in *Community Relations in Superfund: A Handbook*, Interim Guidance (EPA, 1988).

Public input on the Proposed Plan constitutes the basis for evaluation of the NCP'S ninth criterion, "Community Acceptance. "

Step 6. **Prepare and finalize ROD.** (More detailed information on preparing and finalizing RODS is given in DOE's RI/FS guidance, Submodule 6.2). A ROD is the formal decision document for an early or interim remedial action. A ROD has four main roles: (1) to serve a legal function by documenting that the remedy selection process was conducted in accordance with the requirements of CERCLA and the NCP; (2) to provide the public with a consolidated source of history, characteristics, and risks posed by the conditions at the site, as well as a summary of the cleanup alternatives, their evaluation, and the rationale behind the selected remedy; (3) to include the responsiveness summary to public comments; and (4) to outline the engineering components and remediation goals of the selected remedy. An example ROD outline is presented in DOE's RI/FS guidance, Submodule 6.2, Note A.

The ROD is required to consist of three basic elements:

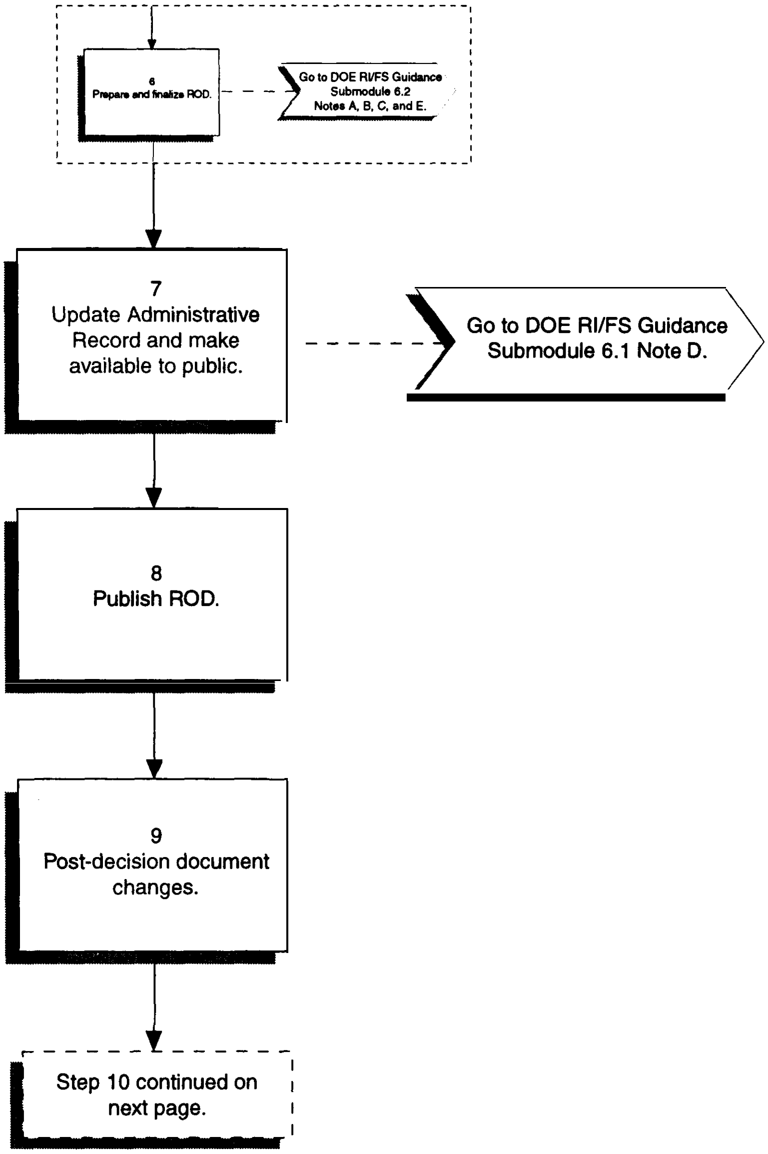
- A Declaration that functions as an abstract of the key information contained in the ROD and is the section of the ROD signed by the EPA Regional Administrator or Assistant Administrator and the authorized DOE Field Office manager. DOE's RI/FS guidance, Submodule 6.2, Note B provides an example of suggested wording for the Declaration.

- A Decision Sumrnary, which provides formal acceptance of the RI/FS approach and results, including the conceptual site model, as a basis for remedy selection, risk assessment, ARARs evaluation, and alternatives development and evaluation. The Decision Summary also identifies the selected remedy and explains how the remedy fulfills the statutory requirements and CERCLA expectations. DOE's RI/FS guidance, Submodule 6.2, Note B also provides an example of suggested wording for the Decision Summary.

- A Responsiveness Surnmary that addresses the public comments received on the Proposed Plan, RI/FS report, and other information in the Administrative Record. This can be prepared as a separate document. See DOE's RI/FS guidance, Submodule 6.2, Note C for additional information.

An example ROD for an interim action (for the Weldon Spring Site) is provided in DOE's RI/FS guidance, Submodule 6.2, Note E. This particular example provides a good

Submodule 4.6.2 Early Remedial Actions (cont.)



understanding of the components of the ROD and shows how a ROD for an interim action can be somewhat streamlined compared with a final action.

Because EPA will have to sign the ROD, EPA concurrence is essential. The FFA may specify that the State must also sign the ROD. A goal of 15 working days for support agency review is suggested in the EPA ROD guidance. Schedules in specific FFAs may require different review times.

Step 7. Update Administrative Record and make available to public. The Administrative Record was initiated during Scoping and kept current throughout the process. It was brought to a high level of completeness and organization upon release of the FFS and Proposed Plan. At this point, addition of public comments, transcripts of public meetings, and the final ROD should be sufficient to ensure that the Administrative Record is complete. This is necessary in the event of any challenges to the selected remedy. Any court review would be based primarily on the Administrative Record. Additional detail on requirements of the Administrative Record is in DOE's RI/FS guidance, Submodule 6.1, Note D.

Step 8. **Publish ROD.** A newspaper release is required to denote the signing of a ROD. The five required elements of a ROD notice are:

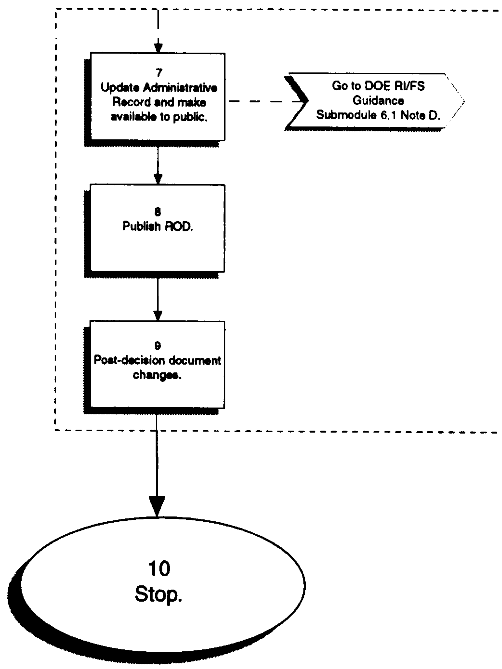
- Site name and notice of availability of the ROD
- Date on which the ROD was signed
- Brief summary of the major elements of the selected remedy
- Details about the hours of availability of the Administrative Record and/or the information repository
- Name and telephone number(s) of individual(s) to contact for further information

Step 9. **Post-decision document changes.** Changes in the approach to the early action may occur after the ROD is signed. Such changes may, for example, occur as a result of the final design effort. If such changes result in a fundamental difference in how the early action is to be carried out [e.g., changing the technology being used (in situ biotreatment replaced by low temperature ex situ thermal resorption)], the public and the extended project team must have an opportunity to comment on any change before the ROD is signed, or they must be given an opportunity for comment before the action is implemented.

The ROD should be written to allow the maximum flexibility in establishing the final approach to remediation (see Steps 7 and 8). This minimizes the potential for changes that require public involvement.

DOE's RI/FS guidance, Submodule 6.3, addresses post-ROD changes for final actions. The formality required in dealing with changes after a final ROD is signed is less appropriate for early actions. Because the early actions addressed in this module are not final actions, more flexibility is allowed in dealing with post-ROD changes –changes to any early actions can be summarized and endorsed in the final ROD. Public notice, with

Submodule 4.6.2 Early Remedial Actions (cont.)



some opportunity to comment on truly fundamental changes, is required. Reopening the ROD should not be required unless the decision document was too narrowly constructed.

Step 10. Stop.

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Note A. EPA-Specified[1] Outline for an Action Memorandum.

I. Purpose

II. Site conditions and background

- A. Site description
  1. Removal site evaluation
  2. Physical, location
  3. Site characteristics
  4. Release or threatened release into the environment of a hazardous substance, pollutant, or contaminant
  5. NPL status
  6. Maps, pictures, and other graphics representation
- B. Other actions
  1. Previous actions
  2. Current actions
  3. Consistency with final actions
- C. State and local authority roles
  1. State and local actions to date
  2. Potential for continued state/local response

III. Threats to public health or welfare or the environment, and statutory and regulatory authorities

- A. Threat to public health or welfare
- B. Threats to the environment

IV. Determination of endangerment

V. Proposed actions and estimated costs

- A. Proposed actions
  1. Proposed action description
  2. Contribution to remedial performance
  3. Description of alternative technologies
  4. EE/CA
  5. ARARs
  6. Project schedule
- B. Estimated costs

VI. Expected change in the situation if action is delayed or not taken

[1]EPA, 1990.

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